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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

SPECIAL NOTICE INSIDE

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Effective 1 June 1987 JPRS reports will have a new cover design and color, and some reports will have a different title and format. Some of the color changes may be implemented earlier if existing supplies of stock are depleted.

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WEST EUROPE.....ivory
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CHINA/ENERGY (CEN)
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USSR: LIFE SCIENCES (ULS)
USSR: CHEMISTRY (UCH)
USSR: ELECTRONICS & ELECTRICAL ENGINEERING (UEE)
USSR: PHYSICS & MATHEMATICS (UPM)
USSR: SPACE (USP)
USSR: SPACE BIOLOGY & AEROSPACE MEDICINE (USB)
USSR: SCIENCE & TECHNOLOGY POLICY (UST)
USSR: ENGINEERING & EQUIPMENT (UEQ)

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EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

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WEST EUROPE

LATIN AMERICA

SCIENTIFIC AND INDUSTRIAL POLICY

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BRIEFS

BASF-TOHO JOINT VENTURE--BASF AG of Ludwigshafen and Toho Rayon have established the Toho Badische Structural Materials company (TBS) in Tokyo. The joint venture, in which the two parent companies have equal participation, will be active in high performance composite materials made with reinforcing fibers and special synthetic materials. These materials, which are increasing in importance both in Japan and throughout the Far East, are at present used primarily in aeronautics and astronautics as well as in the leisure sector. [Text] [Duesseldorf VDI-NACHRICHTEN in German 23 Jan 87 p 5] 8702

CSO: 3698/M156

DFVLR PROJECT MANAGER COMMENTS ON COOPERATION WITH U.S., USSR

Duesseldorf VDI NACHRICHTEN MAGAZIN in German No 1, Jan 87 pp 15-16

[Interview with Eng Horst Schreiber, project director of the German Research and Experimental Institute for Aeronautics and Astronautics (DFVLR), by Gunda Bruederlein and Wolfgang Engelhardt: "German Satellites Are World-Class Technology"; date and place not given]

[Excerpts] VDI-NM: In interplanetary space probes and missions, Europe and especially the FRG have participated quite significantly as far as science and technology are concerned. Does this mean that in this sector we can keep up with the Americans?

Schreiber: That is right. We placed great importance on having a technical participation as well which means not only building good scientific instruments, which transmit scientific data under extreme conditions, but also building the actual space vehicles. With "Galileo," our involvement was in the power unit system. This is a combination which corresponds to our interests. Naturally, we also have a complete technical participation in the development and production of ESA's satellites and space vehicles.

VDI-NM: What are the details of the progress of such a satellite project [ROSAT] in which long scientific and technical preliminary work is still needed?

Schreiber: We proceed by phases, that is, the different steps are defined, from the idea to the final product. The first phase is always a technical and financial feasibility study of the project. The individual elements of the project are then defined in detail, including the plans for the future development of the project. The results from the second phase usually give--in the basic preliminary work--a complete picture of the expenses that will be incurred until the launch. Then comes the third phase, the design and development phase, which again includes specific project controls. It all ends with a test phase where the final flight instrument is subjected to the various extreme stress conditions anticipated during the launch into space and while in orbit.

VDI-NM: How are things going with DFVLR participation in national, European, and international projects?

Schreiber: There are three levels of DFVLR participation. First, we are a research institution which plays a role in the preparation of and participation in specific experiments, depending on which research project is of interest. For example, the DFVLR is deeply involved in earth reconnaissance, materials science, and the exploration of living conditions in space. In basic space research the situation is different--this is the domain of the Max Planck Society. In addition, we are participating in the sector of telecommunications technology.

The second sector in which DFVLR is involved is ground control, from satellite supervision and guidance to data acquisition and interpretation. We began this 20 years ago. Finally, the third area is management, that is, that the management responsibility for projects selected by the Federal Ministry for Research and Technology (BMFT) is given to us. We make appropriate contracts with industrial firms, supervise these contracts, and then take delivery of the results supplied by these firms.

VDI-NM: So, in practice, the DFVLR has the functions of a German national space administration...

Schreiber: Generally speaking, this is true. In fact, the establishment of a national astronautics agency is currently under discussion. The DFVLR could be its nucleus.

VDI-NM: How much does the FRG invest in space research programs?

Schreiber: The government's space program for 1986 totaled DM835 million, including DM272 million for national research and DM561 million for German participation in the ESA program. 22.5 percent of the amount was used for scientific space research, including DM98 million for national programs.

VDI-NM: Do you think that the research sector will continue to be adequately covered in the future, or is there a risk, because of large programs such as Ariane 5, Columbus, and Hermes, that scientific research will come up short?

Schreiber: Personally, I do not believe the risk of reduction exists, but it is feared from various quarters. The construction of large space vehicles, transport devices, space stations, and so on absorbs large sums. And that is primarily for pure technology--the benefit appears much later. A lot also depends on how cost effectively large projects can be managed.

VDI-NM: Is it conceivable that one day we may not cooperate so much with the Americans, but rather with other countries involved in astronautics, with the Russians, for example?

Schreiber: At first glance, it appears possible. Naturally, one must distinguish between two different types of cooperation, the launch and the orbit, that is, operations that we cannot carry out easily with our own systems. In Europe, we are very well served by the Ariane launcher. We are also talking about cooperation in the scientific sector and this cooperation is quite international: scientists from the Western world and also the

Eastern bloc are participating. Above all, the French National Center for Space Studies (CNES) has already been working intensively with the Russians for many years. This means that French experiments are flying on Soviet space missions. It is to be hoped that with the signing of the planned scientific agreement with the USSR, more opportunities for German scientists will become available. However, I am somewhat skeptical about the launching of space vehicles with Soviet rockets. In the final analysis, we receive such favorable conditions with the Americans because the cooperation is reciprocal: we get the launch almost free because, in turn, we take experiments along into space. It is difficult for me to tell whether this combination would also be possible with the Russians. However, we have already undertaken a project with the Indian space agency, and soon we will launch an earth reconnaissance instrument aboard an Indian rocket. Such cooperation may also be possible with the Chinese someday.

8713
CSO: 3698/M154

DFVLR STUDY EXAMINES ROBOTICS IN FUTURE SPACE PROJECTS

Duesseldorf VDI-NACHRICHTEN in German No 3, 16 Jan 87 p 18

["Space Needs Robots and Astronauts: BMFT [Federal Ministry for Research and Technology] Study On Automation and Robotics in the Future German Space Program"; first paragraph is VDI-NACHRICHTEN introduction]

[Excerpt] Bonn, 16 Jan (VDI-N)--New concepts in astronautics were being considered in the countries involved in space travel even before the Challenger catastrophe. It is a general principle that human beings should be supported in space by highly developed automation and robotics in order to free them for tasks that cannot be solved in the long run by mechanical automation: intelligent observation, creative thinking, and adequate decisionmaking.

Even the space projects to date could not have been carried out without the use of automated systems. The currently available degree of automation is no longer sufficient either for existing, or above all for future, requirements of a space station. For the FRG, with its limited resources, integrating automation and robotics as priority themes must be an essential objective of space technology.

That is the gist of a study on "Automation and Robotics in the Future German Space Program" published by the German Research and Experimental Institute for Aeronautics and Astronautics (DFVLR), the project contractor of the BMFT [Federal Ministry for Research and Technology].

In the opinion of specialists working on behalf of the BMFT, the load put on astronauts in current missions already is approaching the psychological and physiological limits of human performance capabilities. Some tasks in space stations no longer can be performed with today's level of automation, which is comparable to that of the D-1 mission.

Furthermore, robots offer the opportunity to carry out control and handling operations or set up experiments in unmanned missions at relatively low costs, the DFVLR reports. In the case of manned missions, this capability could support the astronauts, above all by relieving them of routine tasks and thus reducing the sources of human error considerably. Therefore, the question of

the choice between man or robot is not asked today, rather the problem of the interaction between human beings and robots still has to be solved.

Automation and robotics in astronautics also constitutes one of the high technology areas that is characterized by spinoffs of results into earthbound industry which can promote international competitiveness.

The DFVLR study concludes that excellent prerequisites exist in the FRG in information technology and robotics, citing the automobile, aeronautics, and machine tool industries and reactor safety technology as examples.

Starting with a detailed presentation of the planned robot technology experiment, "Rotex," the study turns to the creation of operational systems for the "Columbus" space station. Following this, the study outlines the possibilities for testing automation technologies on earth before sending them into space in order to minimize costly space tests whenever possible.

The study demonstrates that the introduction of automation and robotics systems into all astronautics projects should be a long term goal, in order to involve human beings only in those situations where they cannot be replaced. Knowledge-based systems and expert systems that are able to operate complicated computer assisted relationships and planning and control tasks are important components in the efficient operation of future astronautics facilities.

8702
CSO: 3698/M157

FRG ROLE IN NEW ESTEC SIMULATOR DEVELOPMENT DESCRIBED

Duesseldorf VDI-NACHRICHTEN in German No 5, 30 Jan 87 p 22

[Article by Wolfgang Engelhardt: "Solarium for Satellites: ESA Puts Large Space Simulator in Operation--Space Equipment is Thoroughly Tested"; first paragraph is VDI-NACHRICHTEN introduction]

[Excerpts] Noordwijk, 30 Jan (VDI-N)--By pressing a large red button, [Netherlands Economic Affairs] Minister Rudolf de Korte switched on the 19 bright xenon lamps of the "large space simulator" which the European Space Agency (ESA) has built in its ESTEC [European Space Technology Center] facility on the North Sea coast of the Netherlands. By doing so, the chief of the technology department of our neighboring country also gave the starting signal for important new European space projects because now the spaceworthiness of very large structures can be checked before the risky launch into earth orbit.

The large ESTEC test center in the Netherlands is concentrated in one building and includes:

--an experimental station for mechanical processes, for example, the deployment of solar cell paddles, erection of an antenna complex, or extension of a magnetometer boom;

--two soundproof rooms for electromagnetic tests to check telecommunications equipment for a satellite or a research probe;

--a data processing control unit for testing the radio remote control of a satellite and the processing of transmitted data;

--the large space simulator for testing satellite design and functional performance in a vacuum and under anticipated thermal conditions.

Realistic Simulation Increases Satellite Reliability

The test chamber consists of one vertical and one horizontal cylinder with a total volume of 2,100 cubic meters. The main chamber is 15 m tall with a diameter of 10 m and its top can be removed for loading and unloading test

objects. The second, horizontal chamber is 14.5 m long and 11.5 m in diameter. It contains the illumination system.

The walls of the two simulator cylinders contain an efficient climate control system; liquid or gaseous nitrogen streams through tubes installed over an area of 615 sq m. This permits the creation of very low temperatures down to minus 193 degrees C as well as very high temperatures up to plus 100 degrees C in less than 2 hours. Such temperatures must be withstood by satellites and probes in space. The refrigerating system, manufactured by Leybold-Heraeus, weighs over 19 metric tons and meets exacting requirements, as demonstrated by the final qualification test lasting 400 hours.

The Xenon Light of the Installation Is Very Similar to Sunlight

The solar simulator "Susi" developed by the Carl Zeiss company is the most complicated element of the large test chamber. This "solar simulator" generates a horizontal beam of artificial sunlight with a diameter of 6 m. The beam intensity of one solar constant (1,360 W/sq m), to which a satellite is exposed in earth orbit, can be reached with only 12 of the 19 installed xenon lamps. All 19 lamps, which have a power requirement of 20 kw each, can increase the beam intensity to 2.5 solar constants. For example, a space probe to the planet Mercury is exposed to this beam intensity at a distance of only 55 million km from the sun and, therefore, must be especially protected from it.

The directional beam of the xenon lamps which are installed outside the test chamber is projected through a quartz window of 1 m diameter onto a honeycomb mirror of 7.2 m diameter whose 121 elements are made of metal. Both the xenon lamps and the mirror elements must be specially cooled during operation in order to withstand the enormous heat buildup and undesirable temperature increase in the test chamber.

The installation's xenon light is very similar to the solar spectrum. Above all, the lateral incidence of the irradiation on the satellite or space probe ensures a realistic simulation of the high internal heat.

With 18 percent, "Susi" has an efficiency factor twice that of the best comparable simulators in the United States. The maximum share of electrical energy possible at today's technical level is converted into radiant energy.

The vacuum installation within the large space simulator is considered another splendid engineering achievement--with it the two large cylinders can be evacuated to 10^{-6} mbar. Several pumps with a flow rate of 3,000 cubic meters of air per hour, including four turbomolecular pumps, are required to produce the desired vacuum in stages within a short period of time. In order to avoid contamination of the test object and the formation of condensation water during the pressurization phase, special protective measures have been taken.

A bidirectional positioning device is very important for the test operations within the solar simulator. It allows any desired positioning and rotation of the satellite relative to the artificial sunlight. The supporting structure of the installation can assume loads of up to 5,000 kg and rotate them

according to applicable specifications either very slowly (1 R/D), i.e., one revolution per day, or very quickly at six revolutions per minute, as occurs with spin stabilized satellites. Once the rate of rotation is selected, it is maintained with a precision of 0.5 percent, as is the angle of alignment, which can also be purposely modified during a test as happens primarily during repositioning of satellites in space.

There Already Is A Waiting List for Tests

The advantage of the ESTEC facility lies in the concentration of all necessary installations in one place. Previously, transportation of sensitive satellites and probes from one country or continent to another was risky and very expensive. The ESTEC center can now test the operational capability of all unmanned space payloads planned by ESA, up to a weight of 2,500 kg and a diameter of 4 m, such as those that will be launched in the 1990's using more powerful Ariane launchers. The first candidates for the "Large Space Simulator" (LSS) are the Earth Resources Radar Satellite ERS-1, the infrared astronomy satellite ISO, the astronomic satellite Hipparcos, and the instrument platform Eureca. However, the test routine for one payload may last several months; as a result, approximately four to five projects per year can be processed.

8617
CSO: 3698/M165

FRG: GBF FIRM LINKS WITH JAPAN, BRAUNSCHWEIG UNIVERSITY

Japanese Biotech Via Bijanca Database

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
5 Feb 87 p 7

[Text] German enterprises and research facilities in the future will have direct access to current information concerning new developments in biotechnology in more than 2500 Japanese research facilities. This will be accomplished through the new database Bijanca at the Association for Biotechnological Research mbH (GBF) in Braunschweig. The database will be available at the end of 1987 for research jobs. According to the estimate of the Braunschweig Association, Japan, now as before, is the world leader in classical bioengineering processes such as are used, for example, in manufacturing alcohol on a large scale. In the area of modern bioengineering (gene technology and molecular biology), Japanese science and business, just like the Federal Republic, have been trying for about 4 years to catch up with the Americans. The world market value of all bioengineering processes is estimated by the GBF at about 250 billion dollars.

At the present time, according to the observations of the Federal Research Ministry, the Japanese are making considerable efforts to become stronger in modern bioengineering. According to the estimates of the Japanese biotechnology development corporation (Bidec), the proportion of biotechnologies in the gross social product will presumably increase from the present 4 percent to 10 percent by the year 2000 (approximately 200 billion DM). Approximately 200 large and medium businesses from pharmacology, chemistry, and the foodstuff industry have already for years been preparing the construction of biotechnical business branches or have already put new products on the market. Even the Japanese steel industry and the breweries are intensely interested in biotechnology.

The Japanese Foreign Trade Ministry Miti presented a corresponding "Technopolis Concept" for 18 developmental areas, already in 1980. Furthermore, in the meantime, 36 of the 46 prefectures have established biotechnical development associations to prepare the local medium and small industry for the new working methods. Improvements in fruit, vegetable, and flower cultivation by biotechnically derived, virus-free seed material as well as improvements in the embryo transfer technique for quality enhancement of meat and egg production, and new methods of fish production are

being emphasized, for instance by feeding the stock with growth hormones produced by gene-technological methods.

According to the data from the Federal Research Ministry, 129 businesses were already on the market in 1985 in Japan with new biotechnical products, as compared with only 18 businesses in the Federal Republic. According to an inquiry by the parliamentary Enquete Commission "Opportunities and Risks in Gene Technology", about 30 businesses were working on gene-technological processes and products in the Federal Republic (end of 1984). According to the representations of the commission, especially Bayer AG (blood coagulation factors), Bioferon (gamma interferon), Biotest (lymphokine), Boehringer, Mannheim (monoclonal antibodies), Hoechst AG (insulin, interferons, interleukines), Boehringer Ingelheim (TPA), BASF (TNF), were particularly concerned with gene-technological product developments.

GBF-University Cooperation Established

Solothurn CHEMISCHE RUNDSCHAU in German 30 Jan 87 p 1

> [Text] Braunschweig Technical University and the Association for Biotechnological Research (GBF) in Braunschweig-Stoeckheim have agreed to cooperate in their research activities in the area of biotechnology.

By their common use of research facilities and by servicing the new course of studies in biotechnology, pure basic research and the application-oriented, industrially related research of a major research facility can in the future work hand-in-hand and can help to manage problems in the areas of health, nutrition, and environmental protection.

In the words of Johann-Toenies Cassens, the Science Minister of Lower Saxony, the coordinated research and teaching of biotechnology is a solid foundation stone for economic development in this future-oriented area. In Braunschweig there are already supposed to be initial settlements of relevant industrial enterprises who wish to collaborate with the science that is available here. A biotechnology center costing 55 million marks is currently being constructed at Braunschweig Technical University. It is supposed to be completed in April of the coming year.

8348
CSO:3698/334

ITALIAN ASSOCIATION FORMED TO PROMOTE BIOTECHNOLOGY RESEARCH

Duesseldorf VDI NACHRICHTEN in German 30 Jan 87 p 20

[Article by Harald Jung: "Italians Promote Biotechnology: Focus on Enzyme and Genetic Research--Obstructed Information Flow Between Industry and Research"]

[Excerpts] Milan, 30 Jan (VDI-N)--"Biotechnology As a Chance for Europe" was the subject of a recent meeting of government officials, economists, and researchers organized by the Milan EEC liaison office. The backdrop and occasion for the talks, which were chaired by Science Minister Luigi Granelli, was the establishment of the Association for the Promotion of Biotechnologies (Assobiotec) by the Federchimica confederation of chemical industries and the new EC Commission framework program for biotechnological research and development at a Community level.

The conference participants unanimously agreed that it is necessary, first of all, to make up for the enormous lead that the Americans and Japanese enjoy in this area. It was also clear to the participants from all the Community member countries that the way to this objective can only be through joint efforts. It is high time that the suitable infrastructure was created for a decisive improvement in efficiency, especially with a view to the flow of information between the numerous research establishments in Europe.

As Claudio Cavazzo, chairman of Farmindustria, stressed, Italy can also contribute considerably to the project. Italian industry already has very clear ideas in mind. The intention is to establish a joint venture among universities, the National Research Council (CNR), and other state institutions in the form of a joint stock company under public law.

The most important step to be taken immediately is the dismantling of contractual and administrative barriers between state and private research, which in Italy is a top priority problem. The aim is to establish close cooperation between universities and industry, as has been the case in the United States for years. The hope is that the existence of an independent financing fund will provide further impetus for innovative research and the founding of new firms, but within the framework of revised fiscal and finance policy.

The recently established Assobiotec has set itself a series of important tasks for the coming years, including the role of intermediary between the ministries of industry and commerce, the possible formation of a technical committee for biotechnology that would be responsible primarily for the subsidies from the innovation fund, and the establishment of working groups to oversee the ecological and commercial aspects of biotechnological products.

Moreover, Assobiotec considers itself to be a link with European Community plans, both in terms of participation and further development and in conformity with national taxation and environmental legislation. Useful advisory functions could also be added for education and training. In this connection, the demand for qualified technicians over the next 10 years is expected to exceed 6,500, especially in the areas of genetic engineering and data processing in agricultural production.

The establishment of the International Genetic and Biotechnological Research Center in Trieste, expected next year, will be particularly important for Italy. Along with this initiative, chemical and pharmaceutical companies such as Montedison, Enichem, Sorin Biomedica, Recordati, Serono, and Menarini, which have been active in these fields for years, are expected to further intensify their activities.

8702
CSO: 3698/M164

EC EXPANDS TECHNICAL, ECONOMIC INFORMATION NETWORK

Call for Bids

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 447, 17 Jan 87 pp 12-13

[Text of EC Commission document: "Community Project for the Development of the Technical Information Market in Europe: Announcement of a Public Call for Bids (86/C 335/04)"]

[Text] 1. In 1984 the EC Commission drew up a 5-year plan for the development of the technical information market in Europe (Footnote 1) (Resolution 84/567/EEC of the Commission dated 27 November 1984 (Official Gazette No L 314 of 4 December 1984). This plan, which was based on Euronet DIANE's three 3-year action plans, together with other activities carried out by the EC Commission such as ESPRIT and RACE, has now reached the halfway point and has led to important progress in the establishment and utilization of information services through advanced technology.

The activities within this program cover seven major areas:

--electronic publication and image databases,
--databases on raw materials,
--patent information,
--biotechnology information,
--economic information,
--development of information services in disadvantaged areas,
--development of library services.

These activities are supported by the work of ECHO (European Community Host Organization), whose tasks are:

--to increase user awareness and to improve the market's transparency by supplying guidance and advisory services as well as training,
--to promote the market's development by supplying databases for use in the precompetitive stage,
--to develop new services using new technologies,
--to supply a European help desk for user problems concerning the information market.

On the basis of a recommendation of the Committee on Scientific and Technical Information and Documentation (AWTID), the Commission has decided to call for bids in order to foster, improve, and expand these activities.

2. The objective of the contract is to create an infrastructure and to make available the relevant skilled personnel to carry out specific tasks set by the Commission in the framework of the 5-year plan objectives. The contract will last 1 year starting 15 June 1987 and permits two 1-year renewals.

In particular, the contract concerns the procurement of office space for 16 people with the usual equipment but bearing in mind the technical aspect of the job to be done. Moreover, nine technicians have to be made available who have experience in the field of information and documentation at the European level, meet the relevant language requirements, and have experience in the operation of an on-line information service.

3. The documents concerning the contract as well as the general regulations on allocations for contracts issued by the Commission will be sent free of charge to any interested party.

Requests including name and address of the interested party should be sent to the following address within 30 work days of the publication date of this announcement:

Mr C. Vernimb
Commission of the European Community XIII-B
C4/012 Jean-Monnet-Building
L-2920 Luxembourg

The aforementioned documents also explain the form in which the bids have to be presented and the selection criteria. Detailed information on the bidding party, including financial status and pertinent experience, must be provided. The Commission offices in Luxembourg must be contacted periodically. The establishment of an office in Luxembourg or its surroundings is requested for this purpose.

4. The completed bids must be submitted no later than 36 work days after publication of this announcement.

Economic Data Transfer System

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 447, 17 Jan 87 p 13

[Text] Thanks to data processing, manufacturers, wholesalers, and retailers throughout the Community should be able to communicate easily with one another and with various agencies. However, in order to achieve this, uniform, or at least compatible, European standards are needed. This is exactly what the EC Commission is now proposing to the Council with the TEDIS project (Electronic Data Transfer System for Commercial Use).

For many enterprises, computer-aided management of orders, accounts, and inventories brings enormous savings in time. According to EC Commission estimates, the electronic transfer of commercial data could save up to 10 percent on end product costs.

In order to remove the obstacles which are still preventing enterprises from making full use of all opportunities at a European level, the Commission has proposed a two-phase project.

In the preliminary phase of TEDIS, general problems are to be tackled, for example, the unification of standards, languages, data confidentiality, and the laws to be observed.

This first phase should last no longer than 2 years at an estimated cost of 6 million ECU. A "pilot project" phase for practical testing in specific sectors will follow.

8703
CSO: 3698/M171

CNR DESCRIBES ACHIEVEMENTS OF NATIONAL DATA PROCESSING PROJECT

Milan ELETTRONICA DOMANI in Italian No 2,Feb 87 pp 74-85

[Article by Professor Angelo Raffaele Meo, director of the National Research Council's Center for Numerical Signal Processing: "Data Processing Finalized Project"]

[Excerpts] The Objectives of the Project

It has become institutionalized practice in the National Research Council [CNR] for the scientific, economic and social objectives of a finalized project to be specified by a feasibility study carried out by a committee of experts. In the case of the Finalized Project for Data Processing [PFI], the work of this committee, headed by Prof Gianfranco Capriz of the University of Pisa, began in December 1979 and was completed in June of the following year.

This feasibility study identified the following three major objectives for the project: the promotion of national industry in this sector; the rationalization of data processing goods and services for government; and the generalized introduction of data processing techniques in industrial processes.

A specific subproject was identified for each of the three objectives. These subprojects were divided into specific areas of research, as described below.

The first subproject dealt with the "Italian Data Processing Industry" and was divided into the following research areas:
1a) distributed mini- and micro-data processing systems;
1b) software engineering;
1c) mathematical software for small computers.

The second subproject was entitled "Government" and was divided into the following research areas:
2a) information systems for decentralized public administration;
2b) distributed databases;
2c) nationwide systems.

The third and final subproject was entitled "Industrial Automation" and was divided into the following two areas:
3a) mini- and micro-data processing systems for industrial automation;

3b) Computer Aided Design [CAD].

At a technical level, the feasibility study focused on distributed mini- and micro-data processing, since it was judged that it would still be several years before Italian companies would have the necessary production capacity for large computers. Finally, the study recommended that the technical solutions and systems developed under the first subproject should be applied within the framework of the second and third subprojects.

The three reports that follow this presentation were prepared by the heads of the three subprojects, and describe in some detail the scientific and technical work carried out for each of the three subprojects. However, the following summary of the work conducted under the objectives indicated in Table 1 may also help the reader achieve a better understanding of the section devoted to the initiatives for the transfer of know-how.

CNET: design and production of a set of prototypes of a processing network with a broadband communication sub-network suitable for the simultaneous transmission of data, texts, images, and voice. The approach adopted for the operating system and language is extremely advanced.

MUMICRO: production of numerous prototypes of advanced processing systems consisting of a number of microprocessors and with high cost/benefit ratios, a modular design permitting additions to be made, extremely rapid response times, and reliability.

METOD: development of a national methodology for the production of software, and production of certain extremely important tools for controling the specification and production phases.

SOFMAT: collection and organization of several important libraries of mathematical software.

COMPUNET: in addition to contributing to the work of establishing international standards for the computer networks sector, Compunet developed important protocols and services for use of the public network by terminals, computers, and both local and geographic networks.

DATANET: design and production of a prototype of a network of small computers connected by the telephone network, developing the hardware and software for integrated management of both the local and remote archives.

DATAID: design and development of a design methodology for computer aided design in databases.

LOCAL AUTHORITIES [COMUNI]: development of the integrated information system for city authorities, producing the prototypes for analysis laboratories and

hospitals, and for use at district and family doctor level, proposing an integrated architecture for management of the national health system, as well as proposing solutions for data management at city level.

PAM: definition of a set of methodologies for the development of information systems for the public administration.

TERRITIORY [TERRITORIO]: design of a number of important, low-cost software and hardware tools for the analysis, storage, display, and processing of territorial data.

LABOR [LAVORO]: design of an information system for management of the job market at regional level, with the necessary subregional breakdowns. The system is designed for the analysis and direct control of the evolution of supply and demand in the job market, with links at ministerial level.

MODIAC: design of a highly modular process computer with a broad spectrum of applications, responding to the needs of the country's major manufacturers and of the many small and medium-size companies in Italy that apply data processing for product and process innovation.

CADME: development of an organic set of modules for the computer aided design of mechanical parts and systems.

CADFI: development of certain support tools for the computerized design of structures to be studied using the finite elements method.

Last, the project requested by CIPE, for an information system for the analysis and control of national data processing, was developed. Inadequate resources meant that no prototype of this project was produced.

Objective CNET

Protocols for Local Networks

An optical fiber bus was developed in collaboration with CSELT [Research Center and Laboratories for Telecommunications], while a coaxial cable transmission network was developed in collaboration with Olivetti and Selenia. These employ two new protocols (EXPRESS and L-EXPRESS, both patented). CSELT is continuing this research within the framework of the European Community's ESPRIT program (Lions project), while Selenia is using the research for its own products (the Midas network for the [Italian] Navy).

Distributed Development Environment

The system language selected was ADA, a language supported by the U.S. Defense Department and by the European Community, adapting this language for the

programming of distributed systems. The nucleus of the software development environment, parts of the compiler, and the backup system during working time were produced in collaboration with Olivetti (working in close collaboration with another project, PAPSE, financed by the EEC). A number of the major tools for the integrated software development environment were implemented in collaboration with Systems & Management [S&M] and Italtel.

In collaboration with an American company, GSG of Salem, New Hampshire, Olivetti is putting the prototype into industrial production, while S&M is continuing the research with a grant for applied research from IMI [Italian Institute for the Financing of Small and Medium-Size Companies].

Formal Definition Methodologies

A group of university researchers produced a formal definition of the ACNET architecture. The innovative approach adopted was subsequently applied to the formal definition of ADA in an extremely important project financed by the EEC and directed by an Italo-Danish consortium (Multi-Annual Programme: The Draft Formal Definition of ADA).

Objective MUMICRO

Hardware Architecture for Multi-microprocessor Systems

Development was centered on the production (coordinated with the MODIAC objective in the third subproject) of the M3BUS component and a series of circuit cards. The participants were CSEA (a consortium of small companies in Turin) and Telettra, which used the same bus in its microprocessor.

Programming Environment for Distributed Systems

The MML programming system for multi-microprocessors was developed primarily by CISE [Center for Information, Studies and Experiments] and by TXT Techint, who are continuing the research with financing from the Funds for Applied Research. This is an innovative system which makes it possible to specify in a high-level language the competitive aspects, the physical configuration of the system, and the software distribution in the various memories.

Reliability

In order to acquire an adequate level of reliability, Selenia developed some of the most modern primitives in existence (stable memory and atomic action) for its multiprocessor architecture, MARA.

Objective METOD

Methodologies for Analysis of Requirements

Italtel applied its own DAFNE methodology (the trademark registered jointly by the CNR and Italtel), also used for the large-scale information system of the Government Accounting Office. This methodology is also used in the EXPRIT project entitled GRASPIN.

Software Development Tools

In the software development area, Software Sistemi has developed the GESANA industrial accounting system (which will be engineered and marketed). Italtel has produced an automatic test generator for telephone software on the basis of the specifications written in the SDL language (now used internally). Finally, Olivetti has used the syntax-guided DUAL editor for the integrated construction of documentation and programs (this is now complete, is used internally, and is sold by the LPS company of Turin under the name Keyline).

Objective DATANET

Distributed Archives System

The hardware and software systems developed for the connection of small computers (produced primarily in Italy) on the public data transmission network were adopted in the SISNET prototypes. In addition, the consortium DATANET Associates, composed of a number of companies and public organizations (Sistema in Rome, ARG in Milan, Software Sistemi and CSATA [Center for Studies and Applications in Advanced Technologies] in Rome), currently is developing an independent line of products based directly on the DATANET-SAD prototypes and intended for a broad range of telematic applications. This work is being done with financing from the Fund for Applied Research.

Objective DATAID

Testing of the Methodology

Some of the operating units in the PFI field-tested all the methodological tools designed under this objective. The most important tests conducted included the development of information systems for the Credit and Loans Organization for the South of Italy and for the Modena local authorities, and the production of the database for the prime minister by ISTAT [Central Institute of Statistics].

IPACRI [Institute for the Automation of Italian Savings Banks] has adopted a method of data analysis based on DATAID in a number of extremely important projects. Enidata has adopted the DATAID method for data analysis in software product engineering. Italsiel [Italian Company of Electronic Information Systems] has incorporated an important support tool for conceptual design in DAFNE.

CRAI [Consortium for Data Processing Research and Applications] is engineering the EOS prototype for the physical design of CODASYL systems. Systems & Management is engineering the DIALOGO [dialog] module, developing a parallel version in a UNIX environment. Data Base Informatica of Rome has developed the INCOD module for conceptual design into an industrial product which is already available on the market.

Objective TERRITORY

Graphics Systems for the Management of Territorial Data

The S. Salvadori company has already produced a line of industrial products from the prototypes of the MFA/250/LS, MFA/250/TV, MFA/36/TV, and MFA/DIGICART microphotometers developed and patented by the PFI. Again under license from the CNR, the company is developing a line of workstations for digital radiology and ophthalmology. Geosystem has completed development of the Geosys territorial information system designed under the PFI. Similarly, the company Scriba (formerly Tasco) has completed the SVP 1000 integrated station with hardware and software for processing of territorial data.

Under the CNR GEPITER license (see the report on the subproject), Gould is completing development of a high-resolution graphics station. Also, the company is transferring the GEPITER modules into a UNIX environment in order to produce a parallel product with superior transfer characteristics.

VDS has engineered the prototype developed in collaboration with other operating units in the PFI, producing a new, very hig-quality pictorial graphics station.

Other industrial initiatives are also emerging. Particularly significant are the Aeritalia initiative for non-destructive testing of materials for aeronautical applications, and the Ansaldo, Olivetti, and Italcomputer initiatives to acquire the licenses for use of the know-how acquired within the framework of this objective from the CNR.

Objective MODIAC

Process Control Computer

When work on the PFI began at the end of 1979, the 1,000 or so Italian companies operating in the manufacturing and control sector almost exclusively used hardware and software produced abroad. The only exception to this was represented by very small systems using 8-bit microprocessors. Today, many of these companies (including Esacontrol, the Ansaldo group, Elsag, and Selenia) use a computer of their own designed under the PFI, thereby achieving substantial added values and making themselves independent of foreign suppliers with regard to the most important components from a strategic

viewpoint. Moreover, the product characteristics--a high processing speed thanks to the use of 16-bit microprocessors and a multi-microprocessor architecture, high maintenance and reliability levels, a modular design, numerous peripheral units, complete basic software, and the availability of a local network--make it possible to achieve elevated cost/performance ratios.

We would like to mention here some of the most important applications in economic and technical terms. The companies Esacontrol, Telettra, and Landis & Gyr have installed a MODIAC processing network in each of the 40 ENEL [National Electricity Board] remote supervision and control centers in order to cover the entire distribution of electricity in this country.

On the Florence-Rome railroad, Ansaldo is installing complex local networks for railroad traffic control. Each network is based on local networks of 15 MODIAC processors connected to 40 remote-controled peripherals. This application will probably be reproduced on numerous other railroad junctions. Also, Ansaldo is installing the first control stations for urban subways. Each control station will employ two MODIAC processing nodes for each urban station, connecting all the stations and the electric substations. A radio link between the stations and the moving trains will permit global monitoring of the systems and total traffic control.

Prima Progetti and Mechtron have equipped the MASCOT IV remote handler, designed by ENEA [National Committee for R&D in Nuclear and Alternative Energy] for nuclear power station maintenance, with sophisticated control electronics.

Objective CADME

Software for Mechanical CAD

Italcad (a company of the Selenia Elsag group) and Olivetti Tecnost are putting the CADME prototype into industrial production in order to produce and market two different software products.

Marangoni has already obtained a license for use from the CNR. Also, the contracts for granting licenses for use of the trademark and exploitation of the related know-how are presently being defined between the CNR and Tormene of Padua, Letena of Genoa, Fata of Turin, Delphi of Viareggio, B-ART of Bologna, Pinifarina of Turin, Piovan of Venice, Molteno Cometti of Milan, IRTA [expansion unknown] of Turin, and several research and teaching institutes.

150 other companies have expressed interest in using CADME for internal requirements.

The scientific work of CADME is continuing within the framework of the Finalized Project for Mechanical Technologies.

Objective CADLO

Software for Logic CAD

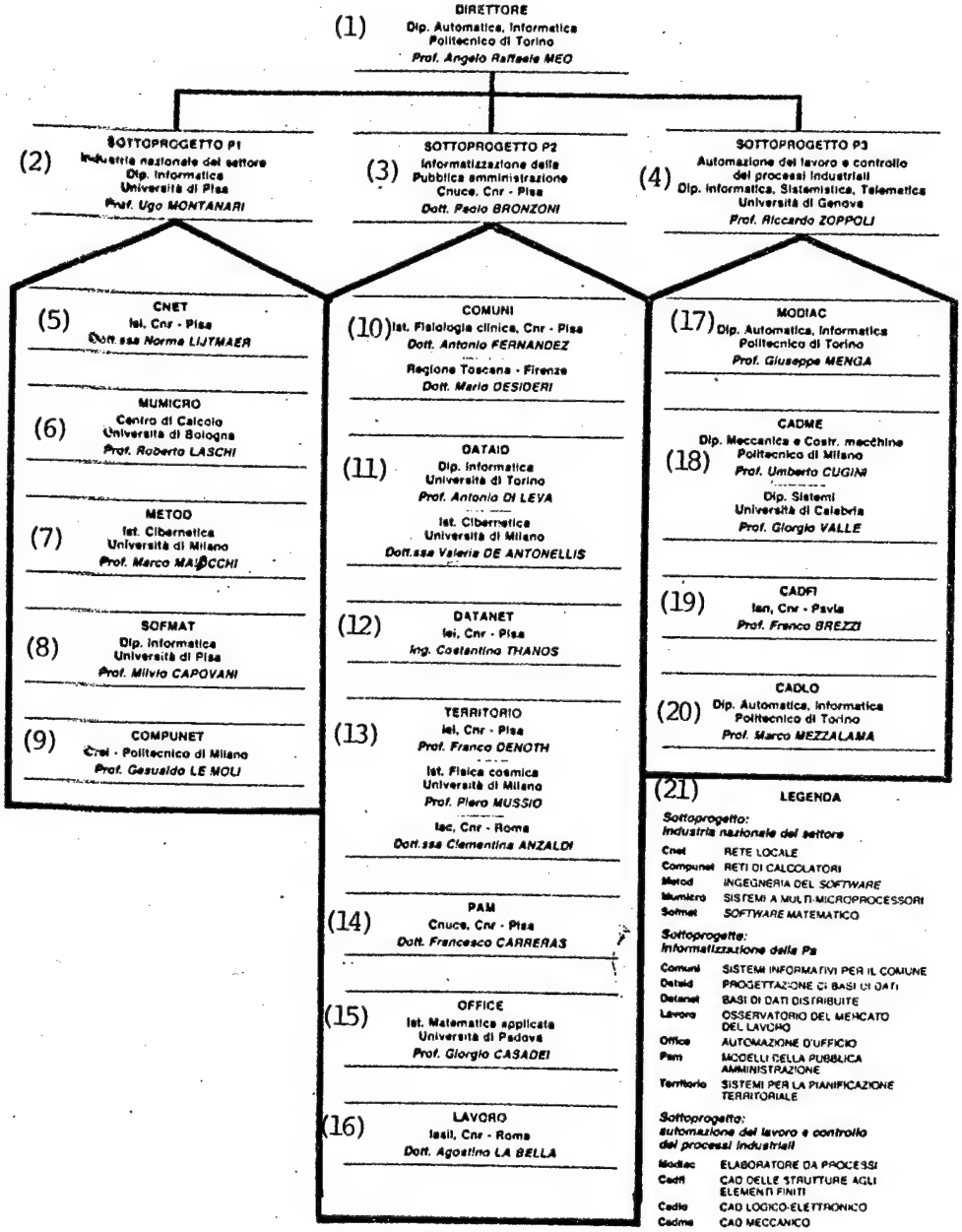
Although the financing levels for the PFI were always extremely low, and financing in fact was cut off altogether after the first years of work, CADLO has given rise to two EEC projects, the CUT project and the CEREC project (microelectronics regulation). Also, an integrated circuit simulator was produced under the CADLO objective which is used by the SGS and Olivetti Tecnost industrial designers.

Patents

Many other initiatives for using the results of the scientific work of the PFI have either already emerged or are coming to light, and presumably there will be others.

In order to evaluate at least partially the contribution made by the CNR to the development of the Italian data processing industry, it was considered beneficial to patent those results which seemed most suitable for direct exploration. A total of 40 patents were taken out [for this purpose].

Table 1 Organization of the Finalized Project for Data Processing by Subprojects and Technical Objectives



Key:

1. Director, Department of Automation and Informatics, Turin Polytechnic - Prof Angelo Raffaello Meo
2. Subproject P1, National Industry in the Sector, Department of Informatics, University of Pisa - Prof Ugo Montanaro
3. Subproject P2, Application of Informatics to the Public Administration, ENUCE, CNR, Pisa - Dr Paolo Bronzoni
4. Subproject P3, Automation of Labor and Control of Industrial Processes, Department of Informatics, Systemics, and Telematics, University of Genoa - Prof Riccardo Zoppoli
5. CNET - CNR Institute, Pisa; Dr Norma Lijtmaer
6. MUMICRO - Computation Center, University of Bologna; Prof Roberto Laschi
7. METOD - Dept of Cybernetics, University of Milan; Prof Marco Maiocchi
8. SOFMAT - Dept of Informatics, University of Pisa; Prof Milvio Capovani
9. COMPUNET - CRAI-Milan Polytechnic; Prof Gesualdo Le Moli
10. COMUNI - Dept of Clinical Physiology-CNR, Pisa; Dr Antonio Fernandez
    Tuscany Region, Florence; Dr Mario Desideri
11. DATAID - Dept of Informatics, University of Turin; Prof Antonio Di Leva
    Dept of Cybernetics, University of Milan; Dr Valeria De Antonellis
12. DATANET - CNR Institute, Pisa; Eng Costantino Thanos
13. TERRITORIO - CNR Institute, Pisa; Prof Franco Denoth
    Dept of Cosmic Physics, University of Milan; Prof Piero Mussio
    CNR Institute, Rome; Dr Clementina Anzaldi
14. PAM -CNUCE, CNR, Pisa; Dr. Francesca Carreras
15. OFFICE - Dept of Applied Math, University of Padua; Prof Giorgio Casadei
16. LAVORO - ISSIL, CNR, Rome; Dr Agostino La Bella
17. MODIAC - Dept of Automation and Informatics, Turin Polytechnic; Prof Giuseppe Menga
18. CADME - Dept of Mechanical Engineering, Milan Polytechnic; Prof Umberto Cugini
19. CADFI - IAN, CNR, Pavia; Prof Franco Brezzi
20. CADLO - Dept of Automation and Informatics, Turin Polytechnic; Prof Marco Mezzalama
21. Legend

    Subproject: National Industry in the Sector
    CNET - Local Network
    COMPUNET - Computer Network
    METOD - Software Engineering
    MUMICRO - Multi-microprocessor Systems
    SOFMAT - Mathematical Software

    Subproject: Application of Informatics to the Public Administration
    COMUNI - Information Systems for Local Authorities

DATAID - Design of Databases
DATANET - Distributed Databases
LAVORO - Monitoring of the Job Market
OFFICE - Office Automation
PAM - Public Administration Models
TERRITORIO - Systems for Territorial Planning

Subproject: Automation of Labor and Control of Industrial Processes
MODIAC - Process Computer
CADFI - CAD of Structures to Finite Elements
CADLO - Logic-electronic CAD
CADME - Mechanical CAD

Table 2 Operational Units of the National Data Processing Project

CNR Bodies

Institute for Genoplasma, Bari
Research Center for Operator-Computer Interaction, Bologna
National Group for Algebraic and Geometrical Structures and Their Applications, Florence
National Group for Mathematical Data Processing, Florence
Institute for Teaching Technologies, Genoa
Laboratory for Applied Mathematics, Genoa
Research Center for Space Telecommunications, Milan
Research Center for Data Processing Engineering Systems, Milan
Institute for Mathematics and Data Processing Applications, Milan
Institute for Cosmic Physics, Milan
Cybernetics Laboratory, Naples
Research Center for Hybrid Computers, Naples
Research Laboratory for System Dynamics and Biomedical Electronics, Padua
Laboratory for Numerical Analysis, Pavia
Institute for Data Processing, Pisa
Cnuce, Pisa
Laboratory for Clinical Physiology, Pisa
"M. Picone" Institute for Calculus Applications, Rome
Research Center for Monitor Systems and Automatic Calculus, Rome
Institute for Scientific Research and Documentation, Rome
Institute for System Analysis and Data Processing, Rome
Center for Numerical Signal Processing, Turin

Univertsity Operating Units

Institute of Physics, Bari
Institute of Mathematics and Statistics, Bergamo

Automation Institute, Bologna
Institute of Electrotechnology and Electronics, Bologna
Institute of Applied Mathematics, Bologna
Institute of Sociology, Bologna
Institute of Mechanical Engineering, Bologna
Electronics Laboratory, Brescia
Institute of Construction Sciences, Cagliari
Mathematics Institute for Engineers, Cagliari
Electronics Institute, Catania
Department of Systems, Cosenza
Department of Mathematics, Cosenza
Numerical Analysis Laboratory, Cosenza
Electronics Institute, Florence
Institute of Applied Mathematics, Florence
Institute of Computers Science and Systemistics, Florence
Institute of Mathematics, Florence
Electronics Institute, Genoa
Institute of Constructions Science, Genoa
Institute of Geophysics and Geodesic, Genoa
Applied Mathematics Laboratory, Genoa
Cybernetics Institute, Milan
Institute of Electronics and Electrotechnology, Milan
Institute of Mechanical Engineering, Milan
Institute of Pharmacological Sciences, Milan
Institute of Mathematics and Computer Science Applications, Milan
Physics Institute, Milan
Crei [European network center for data processing], Milan
Mathematics Institute, Naples
Institute of Electrotechnology and Electronics, Padua
Institute of Applied Mathematics, Padua
Center for Scientific Calculus, Padua
Institute of Sociology, Padua
Institute of Health Statistics, Padua
Institute of General Physics, Palermo
University Calculus Center, Palermo
Institute of Mathematics, Palermo
Electronics Institute, Palermo
Institute of Mathematics, Parma
Institute of Computer Science and Systemistics, Pavia
Institute of Applied Health Sciences, Pavia
Department of Computer Sciences, Pisa
Institute of Electronics and Telecommunication, Pisa
Institute of Financial Mathematics, Pisa
Institute of Clinical Physiology, Pisa
Institute of Mathematics, Rome
Automation Institute, Rome
Higher Institute of Health, Rome

Institute of Information Science, Salerno
Institute of Veterinary Medicine, Teramo
Institute of Electronics and Telecommunications, Turin
Department of Automation and Computer Science, Turin
Institute of Numerical Calculus, Turin
Department of Quantitative Methods, Trento
Institute of Mathematics, Trieste
Institute of Mathematics, Venice

Industrial Operating Units

Lenco Spa, Ancona
Mael Computer Spa, Aquila
Italdata Spa, Avellino
Software Systems Spa, Bari
New Pignone Spa, Bari
Csata [Research Center for Advanced Technologies], Bari
Telettra Spa, Bologna
Tema Spa, Bologna
Gs Ogea Spa, Bologna
Siap Spa, Bologna
Cad Study Spa, Como
Dne [Digital Network Eng.] Spa, Cosenza
Crai [Calabria Consortium for Computer Science Research and Applications], Cosenza
Tesak Spa, Florence
Datacoop srl, Florence
Sago Spa, Florence
Elea Spa, Florence
Vds srl, Florence
Geosystem Salvadori Spa, Florence
Ansaldo Spa, Genoa
Italimpianti Spa, Genoa
Elsag [Electronics S. Giorgio] Spa, Genoa
Selesta Spa, Genoa
Comau Spa, Grugliasco (Turin)
Olivetti Spa, Ivrea (Turin)
Oto Melara Spa, La Spezia
Italtel Spa, Milan
Syntax Spa, Milan
CISE [Center for Information, Studies, Experiments] Spa, Milan
Ercole Marelli Traction Spa, Milan
Ars Spa, Milan
Alfa Romeo Spa, Milan
Sisdoconsult Spa, Milan
Telecommunications Italian Company Siemens Spa, Milan
Etnoteam srl, Milan

Secma Spa, Milan
System and Management Spa, Milan, Pisa, Turin
Sogess Spa, Milan
Arg Spa, Milan
Cesi [Italian Experimental Center for Electrotechnology], Milan
Intel Corporation Italian, Milan
Zeltron Spa, Milan, Udine
Tasco Spa, Milan
Carlo Gavazzi Control Spa, Milan
Sgs Ates Spa, Milan
Txt Technit Spa, Milan
Saico Spa, Milan, Naples
Gould Sel Computer Spa, Milan
Prima Projects Spa, Moncalieri (Turin)
Coop [Data Processing Company], Naples
Cres [Sicilian Center for Electronics Research], Palermo
Antonucci srl, Pisa
Elit Micromegas Spa, Pisa
Sicei Spa, Pisa
Elco Spa, Pisa
Cooperative Electronics Center srl, Ravenna
Celcoop srl, Ravenna
Selenia Spa, Rome, Pisa
Italsiel Spa, Rome
Isfol [Institute for the Development of Professional Training], Rome
Sipe Optimation Spa, Rome
Infolab srl, Rome
Italeco Spa, Rome
Telespazio Spa, Rome
Luiss [Free International University for Social Studies], Rome
Inforav [Institute for the Development and Advanced Management of Information], Rome
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Intecs srl, Rome
Cisi Spa, Rome
Systena Spa, Rome
Ipacri Spa, Rome
Irsi, Rome
Dsa Spa, Rome
Gepin Spa, Rome
Ugo Bordoni Foundation, Rome
Ised Contraves Spa, Rome
Sarin Spa, Rome
Studio Staff srl, Rome
Sistema Spa, Rome
Slamark International, Rome

Datanet Associated Spa, Rome
Data Base Informatics Spa, Rome
Acs srl, Rome
Ial, Rome
Isis [Institute of Health Information], Rome
Cselt [Research Center and Laboratory for Telecommunications], Turin
Csea [Consortium of Electronics and Automation Development], Turin
Fiat Auto Spa, Turin
General Systems Spa, Turin
Dea [Digital Electronic Automation] Spa, Turin
Olivetti Technnost Spa, Turin
Fiat Research Center Spa, Turin
Sepa Spa, Turin
Industrial Plant Design srl, Turin
Olteco Spa, Turin
Aic Spa, Turin
Informatics Friuli Venezia Giulia Spa, Trieste
Sogesta Spa, Urbino
Aermacchi Spa, Varese
Aeronautical Construction G. Agusta Spa, Varese

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8616
CSO: 3698/M203

BRIEFS

ESPRIT SOFTWARE ENGINEERING PROJECTS--After just 3 years, the European Strategic Program for Research in Information Technology (ESPRIT) has led to concrete results in the data processing field. Numerous companies and institutions have participated in the development of these products and standards. Of particular note is a common software model developed by several large European computer companies. Six of the most important European computer firms (Bull, GEC, ICL, Nixdorf, Olivetti, and Siemens) have joined together within the framework of an ESPRIT project to produce software more quickly, with less margin for error, and more cheaply than in the past. This cooperation has led to the creation of the so-called PCTE [Portable Common Tools Environment] system. The joint stock company EMERAUDE began initial marketing of computer programs of the new PCTE system in September 1986. A further result of PCTE work has been the formation of an industrial group which aims to introduce a UNIX standard to link computers produced by different companies. This group, called X-OPEN, includes six European companies (Bull, ICL, Nixdorf, Olivetti, Philips, and Siemens) and two U.S. companies (DEC and Sperry). [Text] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 448, 29 Jan 87 p 13] 8701

FRG COMPUTER PROTOTYPE PROJECT--In cooperation with the Nixdorf and Siemens computer manufacturers, the Fourth Institute of Computer Science at the University of Dortmund (Prof Dr Heinz Beilner) has developed tools and methods for prototypes of high performance computer systems. The GESINE cooperative project is subsidized by the BMFT and its first phase ends in 1987. Approximately DM3.4 million has been invested in the work of the research team in Dortmund since 1985. The concrete achievements are represented by several basic methods that can be used for the development of various tools for the creation of hardware and software as well as the HIT program system for the development of computer systems. Various measuring, modeling, test, and evaluation methods are used within the framework of the GESINE project which can provide answers regarding the efficiency and reliability of both hardware and software systems. The GESINE tools support the design, development, and operation of computer systems. The contribution of the Dortmund research team concerns primarily the "throughput criteria," that is, the productivity of the systems. [Excerpts] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 449, 11 Feb 87 p 6] 8617

CSO: 3698/M192

FRG INFORMATION RESEARCH INSTITUTES--Publishing of the future, information management in enterprises, and the wide application of expert systems in service firms are projected themes of technical research and development in the information technology field which will soon play a special role as additional priorities for the scientific work of the Society for Mathematics and Data Processing mbH (GMD). Two new GMD organizations will start operations in 1987 in this connection: in Darmstadt, the Research Institute for Integrated Publication and Information Systems, the GMD's fourth research institute; and in Cologne, the Research Institute for Information Economics and Economics Data Processing which, as with the two other GMD research establishments, will cooperate closely with industry and the local university. With these two new foundations, the GMD is fulfilling a political mandate it acquired as a result of the restructuring of the Society for Information and Documentation (GID) recommended by the Scientific Council. GID's know-how, personnel, and budget funds are transferred to both new research institutes and are complemented there by additional scientists and by the GMD. [Excerpt] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 449, 11 Feb 87 pp 6-7] 8702

CSO: 3698/M196

FRG FIRM'S NEW CO_2 LASER METHOD FOR INDUSTRIAL APPLICATION

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 449, 11 Feb 87 p 12

[Excerpts] Previously available CO_2 lasers, particularly those used for cutting sheet metal, have failed or partially failed to meet the requirements for industrial production applications. This has led to high costs--for example, for the maintenance of highly complex laser equipment--and has thus affected profitability. Requirements concerning the quality of the cut have also led to requests for improved energy distribution in the laser beam. In order to solve these problems, Trumpf GmBH & Co., a medium-sized machine manufacturing company in Ditzingen near Stuttgart has, in a project subsidized by the BMFT [Federal Ministry for Research and Technology] and in close cooperation with research institutes, taken the initiative to develop a completely new technique for CO_2 lasers: laser gas excitation through high frequency glow discharge.

With high frequency excitation, it is possible to obtain a higher performance density of CO_2 gas and a more compact structure than with direct current excitation. In addition, the excitation potential, which is approximately 10 times lower, increases operational performance and safety. Because of separation of electrodes from the laser gas (which is due to the energy link through the glass of the discharge tubes), the laser gas will no longer be contaminated with electrode waste. The spatial and temporal uniformity of glow discharge permits better beam quality and pulsability than is possible under comparable conditions with lasers excited by direct current. The discharge burns steadily and evenly through the use of high frequency, thus permitting uniform quality of the working process for long periods of time.

Suitability for industrial use, which is the project goal, requires extensive automation of the processes of supervision and of operation--some of them extremely complex--without which production in a three-shift operation, for example, is impossible. For this operation, push-button starting of the laser is important since the operator would then have no further involvement with the laser.

The Federal Ministry for Research subsidized the project between 1982 and 1986 with a total of approximately DM3.33 million at a rate of 50 percent of the costs.

8701
CSO: 3698/M194

BRIEFS

BERLIN SOLID-STATE LASER INSTITUTE--Elmar Pieroth, Berlin's Economy Senator [and member] of the Solid-State Laser Institute, which was established on 5 December in Berlin, expects West German firms to follow the institute's example and settle in Berlin. In the next 5 years, the Senate plans to provide the new foundation with DM10 million. The Federal Research Ministry is also participating with an additional DM10 million. The task of the institute will be to carry out joint research with the technical university and various commercial firms. In this way, according to Pieroth, the results of basic research can immediately flow into applications oriented research, and the market's requirements can thus be met in an easier, faster, and more client-oriented way and turned into competitive products. The firms participating in the Solid-State Laser Institute as shareholders hold 49 percent of the DM500,000 common stock. The remaining 51 percent is in the hands of the Fraunhofer Society for the Development of Applied Research (Munich) and the Economic Development Company of Berlin. Berlin's Technical University is providing as part of a cooperation contract DM2.2 million as well as laboratory and office space. The director of the institute is Prof Hans Weber, considered the leading FRG scientist in the solid-state laser field. [Excerpts] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 447, 17 Jan 87 pp 7-8] 8613

SATELLITE STAR SENSOR--Under contract with the ESA (European Space Agency), the Aqua-TV Company, Corporation for Industrial Cameras and Microelectronics GmbH in Kempten (Allgaeu), has developed a star sensor for the telecommunications satellite ECS 5. This star sensor is being built in Toulouse. Despite rotation of the satellite, the sensor is supposed to remain steadily fixed on a certain star. This way, the position of the satellite from the earth can be verified and corrected. The star sensor consists of a camera which continuously transmits information to earth by means of a telemetry system. The requirements imposed on such a camera are very stringent and extend from freedom from shock and vibration, extreme sensitivity of the lens to freedom of maintenance. In collaboration with MBB Company/Erno, the Allgaeu enterprise furthermore has developed a triple combination of solid state cameras which are supposed to be used in the space lab mission D-2. The cameras are here used for observing the experiments and are equipped with electronics tailored to this purpose. [Text] [Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 26 Feb 87 p 7]

8348
CSO:3698/334

FRG TOSHIBA SUBSIDIARY BEGINS DRAM CHIP PRODUCTION

Duesseldorf VDI NACHRICHTEN in German No 7, 13 Feb 87 p 2

[Article by Robert Donnerbauer: "Japanese Megabit Chips From Braunschweig: Semiconductor Memory in Continuous Production, Manufacture in Europe To Preclude Protectionism"; first paragraph is VDI-NACHRICHTEN introduction]

[Text] Duesseldorf, 13 Feb (VDI-N)--Like many other Japanese electronics manufacturers, semiconductor producers are also increasingly moving their plants overseas. This is a way to prevent protectionist measures but also, according to Toshiba Corp. Senior Vice President Tsuyoshi Kawanishi, to simply manufacture products near the market. On the occasion of the launch of 1-Mbit DRAM chip production in Braunschweig, Kawanishi explained that worldwide cooperation in such a high-tech sector is inevitable.

Toshiba Semiconductor GmbH (TSG) in Braunschweig, a wholly owned subsidiary of Japan's Toshiba Corporation, started mass production of 1-Mbit DRAM chips on 6 February. According to Tsuyoshi Kawanishi, this initiative confirms the corporation's policy of setting up production plants near the market in purchasing countries throughout the world.

While Toshiba--which, according to company data, ranks second as a semiconductor producer, following NEC and preceding Hitachi--already has a monthly production output in Japan of about 1 million 1-Mbit DRAM chips, TSG in Braunschweig is starting with a monthly output of 100,000 pieces which will reach 300,000 pieces per month by the end of the year, according to TSG Operations Director Dr Holger Karstensen.

The Braunschweig plant only assembles the chips. The finished wafers, which require the greatest amount of know-how, are produced in Japan. Karstensen comments: "The production of wafers requires huge investments, sums on the order of hundreds of millions. This production also calls for adequate experience. A young company like ours definitely needs at least 2 more years to achieve this level."

The question of whether the Braunschweig company will take up research and development activities in this specific field is, for Karstensen, inappropriate for the medium term. He points out that Japan refrains from

setting up research centers abroad and that the required knowledge is not yet transferable.

Braunschweig's production is aimed exclusively to cover the European distribution network. A similar plant is due to become operational in the United States by mid-1987.

But what is the rationale for the highly observable trend of Japanese firms to produce in Europe? Karstensen explains: "For the Japanese, manufacturing in Europe first implies an expansion of the market but is also a way to head off protectionist measures." By manufacturing in the Community, companies acquire the right to market their products here.

Siemens, which manufacturers the megabit chip with Toshiba technology nearby in the FRG, is to Kawanishi an example of another corporate policy: cooperation with leading international companies in order to improve productivity in the semiconductor sector. This particular case is an example of license exchange. A joint venture between Siemens and General Electric is developing standard cell libraries, which are important for the development of advanced chips. Toshiba has also cooperated with SGS, an Italian semiconductor firm, in CMOS [complementary metal oxide semiconductor] production technology since 1982. Kawanishi also announced that a joint venture with Motorola is due to start in April 1987. This venture will link Toshiba's memory chip expertise to Motorola's microprocessor know-how.

8703
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ESPRIT II PARTICIPATION REQUIREMENTS, PROJECTS OUTLINED

Proposal Submission, Evaluation

Milan BUSINESS in Italian No 3, Mar 87 pp 25-28

[Article by Enzo Bernini: "The Opportunities of ESPRIT"]

[Excerpts] Two billion ECUs, or 3 trillion lire, is the figure allocated by the European Community for the second phase of ESPRIT, the European program for the development of advanced technologies in the sectors of microelectronics and preinformatics [preinformatica], data processing systems, and applications technology, including industrial and office automation systems.

What the European Community in Brussels is essentially asking small, medium and large European companies to do is the following: to supply integrated circuits containing up to 4 million elementary components on a single circuit for specific complex applications; to produce, rapidly and economically, data processing systems, reducing the development costs of certain subproducts such as microprocessors and software modules by a factor of ten; and finally, to develop specific components, for use in industrial and office automation systems, for a vast range of applications in data technology (see box inserts on the following pages).

For this second phase of the program, the European Community indicates that the main objects of the research projects will be banks and insurance companies, telecommunications companies, machine tool manufacturers, the automobile industry, and the aerospace, medical instrumentation, and optics sectors. The aim of this is to attempt to bridge the massive technological gap separating Europe from the United States and Japan.

The only question mark in the allocation of 3 trillion lire--which represents more than 20 percent of Community spending for research over the 5-year period 1987-1991--is the strong opposition expressed by the FRG, France, and Britain, which are trying to cut expenditures by 50 percent. Apart from the chronic disagreements within the European Community, the opportunity is opening up once again for Italian companies to avail themselves of EC financing, as was the case in the first phase of the ESPRIT program. As in the past, this financing will cover 50 percent of the research and development costs of the companies taking part.

In the first phase of the program, Italy participated in 107 of the 254 research projects for a total of 1.1 trillion lire divided among 41 industries, 8 universities, and 13 research centers in Italy. But what are the real problems involved and the real prospects for those who choose to join in the European venture, particularly those organizations which are not data processing "giants?"

How To Participate

The call for bids is published annually, and must be requested together with a workplan outlining the areas of research and the research guidelines. Once the bid has been filled in and sent back to Brussels, the only thing to do is to wait for the response of a committee of experts from all the member nations of the European Community. The initial go-ahead usually arrives after about 2 months, and the proposal is then re-examined and submitted for final approval of the requested financing.

Up to this point, everything appears to be relatively simple. However, if we go into more detail, we realize that it is vital to pay the greatest attention even to those details which apparently are not very important. For example, the ESPRIT documentation refers exclusively to precompetitive research. If the project does not fall within this category, there is no point at all in submitting it. In other words, the objective of the research has to be production of a prototype, not of a product ready to be marketed.

On the other hand, one must not go to the other extreme and submit proposals which would be unlikely to find market outlets. In fact, the ESPRIT committee wants to have guarantees that the prototype can be developed at a later stage into a functioning product which is commercially competitive.

Another essential aspect concerns organization. If the project is not a multinational project, it will be rejected out of hand. Each proposal has to involve at least two European partners. Anyone who submits a proposal without having partners, trusting that a partner can be found in the future, is relegated to the waiting list. Undoubtedly, it is preferable to have one's teammates right from the beginning. Both the proposing party and the partners involved must demonstrate that they have clear ideas about the implementation of the project in terms of both objectives and timing. However, primarily with the aim of helping smaller companies, the EC has set up a database which lists and organizes all the companies in search of partners. In order to be included in this database, it is advisable to write to the secretariat of the ESPRIT program several months prior to publication of the call for bids, giving the details of the company, that is, the name and address of the company, the telephone, telex and facsimile numbers, and the name of the person to contact, the size of the company, the company activity and areas of interest and, finally, the characteristics of the partners the company is looking for.

Then there is the financial aspect. ESPRIT finances 50 percent of all the documented costs of the project; however, an in-depth analysis of these costs has to be submitted in advance. The last aspect concerns information on participants. It is clear that the chances of admission to the program depend on the company's ability to demonstrate that it is in a position to complete the project. Therefore, information must be given concerning the financial situation and technical organization of the company, accompanying this with brief resumes of the researchers who will be working on the project.

Useful Hints

Apart from the formal aspects of the application for admission to the ESPRIT program, there are a number of useful hints which certainly can contribute to a successful outcome of the operation.

Take, for example, the preparation of the application form. A well prepared form can cost several dozen million lire. The game is definitely worth the effort, though, since the committee in Brussels obviously prefers feasibility studies which are comprehensive, rather than preliminary projects thrown together in a hurry.

One aspect that one might think could be taken for granted, but which cannot, concerns the financial status of the various ESPRIT subprograms. Before submitting an application, it is absolutely essential to find out which areas still have funds available. This can be done simply by requesting the annual brochure from the Milan office of the European Community. This brochure shows the projects in progress in each area and the funds still available.

The research proposed by companies must be highly innovative, and must be backed up by in-depth knowledge of the state of the art in the sector concerned. For this reason, companies [proposing a research project] must, together with their partners, provide guarantees that they are able in every respect not only to complete the project but also to exploit the results commercially if the project is successful.

The question of finding partners can be approached in two ways. The first approach is that of an agreement with one of the European data processing "giants." This can make matters a good deal easier, given that it was the multinationals who acted as technical advisers in deciding on the technical and financial structuring of the ESPRIT program, and who have taken an active part in the program from the outset. However, there is a risk that an arrangement of this kind can suffocate the smaller company, which is conditioned by the needs and strategies of the larger partners.

Obviously, there is the lobby of the "big boys," but lobbies of smaller companies have emerged and could still emerge, perhaps in the form of consortiums (see box), which combine to give weight to their projects, taking

to heart the motto that there is strength in numbers. In any case, whoever one may select as a partner, it is advisable to ensure that, from the very beginning, the terms of the agreement are clearly defined.

Finally, it is worth remembering that it is always useful to have a guardian angel. And apparently Brussels is no exception to this rule.

[Box insert, page 26]

Consortiums Can Lend a Hand

Research centers and researchers cost money--a great deal of money. For small and medium-sized companies with a certain level of competitiveness, structures of this kind definitely are out of reach. On the other hand, research and development are of great strategic importance for companies. In order to get around this problem, the solution of research consortiums also is gaining ground in Italy. Companies can either consult or align themselves with these structures in order to solve major R&D problems. Below we give the names of some of the leading research consortiums operating today in Italy in the sectors covered by ESPRIT.

Center for the Diffusion of Technological Information: Department of Electronic Engineering, Via di S. Maria 3, Florence. Tel. 055/4796280/4796271. President: Leonardo Masotto, c/o ENEA, V. le Regina Margherita 125, Rome. Tel. 06/85282608. President: Umberto Klinger. [sentence as published]
CESTEC [Lombardy Center for the Development of Technology and Productivity of Small and Medium-Size Companies], C. so Plebisciti 15, Milan. Tel. 02/711203. President: Claudio Roveda.
DITEL [Ligurian Center for the Diffusion of Technology], Galleria Mazzini 5, Genoa. Tel. 010/543420. President: Giordano Gai.
ERVET Emilia Romagna [Regional Authority for Economic Exploitation], Via Morgagni 6, Bologna. Tel. 051/237135. President: Francesco Cavazzuti.
ISELQUI [Electronics Institute for Industrial Quality], Via Brecce Bianche, Ancona. Tel. 071/8046351. President: Carlo Lucarelli.

[Box insert page 27]

The Sectors Involved in ESPRIT Phase II and the Objectives of This Phase

BUSINESS has listed all the guidelines of the research projects for ESPRIT Phase II.

Semiconductor Elements

High-density integrated circuits (up to 4 million logic gates): development of easy-to-use CAD systems; development of high-density, low power processes; development of a flexible automated production line.

High-speed integrated circuits (with clock frequencies of 5-10 GHz, or gate delays of 50 ps, and a complexity of 10,000 gates): development of very high speed process; special CAD tools; special packaging techniques.

Multipurpose integrated circuits (for chips with both digital and analog functions, with a complexity of 1 million transistors): development of protection processes for dedicated applications; adaptation of CAD tools for combination functions.

Peripheral Unit Technologies

High-capacity magneto-optic and optic search and memorization systems; impact-free printers; screens and devices incorporating sensors and logic components (intelligent devices).

Technologies and Tools for System Design

Reductions of up to 100 percent in the present development costs of system components (such as microprocessors and real time software modules).

System design and production: the entire process, from the stage of definition of the requirements through production, distribution, and maintenance.

Knowledge engineering: acquisition of knowledge; learning systems; knowledge representation; natural language; interaction with user; integration of knowledge engineering with system design.

New system architectures: parallel architectures; programming and test techniques; distributed systems of semiautonomous components; specialized architectures for signal processing; knowledge-based subsystems.

Signal processing systems (signals from: temperatures, pressures, images, and voice); formal description and preprocessing; identification of the characteristics; classification, correction of errors; processing of signals from multiple sensors.

Use and Integration of Data Processing Technologies

For a vast range of applications, with verification of the results in realistic, selected environments.

Factory Automation: for discreet, continuous, and semicontinuous production in a wide range of environments, with attention also to PMI [Programmable Machine Interface]; open systems that can be composed of components from different suppliers; 50 percent reduction in the design-production cycle; 50 percent reduction of downtimes in automated manufacturing systems.

Office systems and integrated information systems (for the office and the home); multimedia systems for offices; integration of data acquisition, monitoring, and control for various types of applications; monitoring, control, and learning systems for the home environment.

Subsystems (low-cost technologies for large-scale applications): work stations for multiple applications; subsystems for distributed systems; local networks; user interface; interfaces with the physical environment.

[Chart page 26]

Contenders for the Research Crown

1.	2.	3.	4.	5.	6.	7.	8.	
Nazioni	**Urss**	**Usa**	**Giappone**	**Rft**	**Uk**	**Francia**	**Italia**	**(1986)**
Ricercatori 9.	1450*	722	342	129	94	92	63	–
Spesa totale 10.	–	88	33	18	12	13	5.5	(8.1)
Spesa/ ricercatore 11.	–	121	96	139	127	141	87	–
Spesa in % Pil (compresa Difesa) 12.	3.7*	2.7	2.6	2.6	2.3	2.3	1.2	(1.46)
Spesa in % Pil (esclusa Difesa) 13.	–	1.8	2.5	2.4	1.6	1.6	–	(1.40)
Spesa rispetto Italia 14.	–	16	6	3.2	2.1	2.3	1.0	–

I dati, elaborati dal Cnr e relativi al 1983, riguardano il sistema scientifico di alcuni paesi dell'Ocse. I dati sui ricercatori sono in migliaia di persone, mentre le spese sono espresse in miliardi di dollari. L'ultima colonna della tabella è riferita alla situazione italiana nel 1986. Le cifre contrassegnate da asterisco sono stimate. 15.

Key:
1. Countries
2. USSR
3. USA
4. Japan
5. FRG
6. UK
7. France
8. Italy
9. Researchers
10. Total spending
11. Spending/researcher
12. Spending as percentage of GNP (including Defense)
13. Spending as percentage of GNP (excluding Defense)
14. Spending compared to Italy
15. The data, relative to 1983 and prepared by the CNR, concern the scientific system in certain OECD countries. The data concerning researchers are in thousands, whereas spending is expressed in billions of dollars. The last column in the table refers to the situation in Italy in 1986. The figures marked with an asterisk are estimates.

[Chart page 28]

The Situation for Almost 20 Years of R&D in Italy

1. SETTORI	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
2. Amm.ne pubblica	169	192	227	252	275	300	373	410	517	612	782	844	953	1.187	1.769	2.125	2.586	3.195	4.222
3. • Stato	9	11	12	13	13	16	14	15	28	27	28	32	34	40	59	77	83	94	..
4. • Organismi di ricerca	50	52	80	86	90	99	117	124	165	195	282	288	372	482	727	817	963	1.253	..
5. • Università	96	112	117	134	145	164	201	220	256	307	367	393	401	468	726	913	1.161	.	..
6. • Altri enti	14	17	18	19	27	31	41	51	68	83	105	131	146	197	257	318	379	1.848	..
7. Imprese	175	207	238	302	348	384	415	507	651	740	902	1.023	1.335	1.710	2.286	2.790	3.441	4.128	5.121
8. • Pubbliche	39	43	51	68	89	98	115	149	212	217	282	278	401	569	767	1.000	1.371	1.585	..
9. • Private	136	164	187	234	259	286	300	358	439	523	640	745	934	1.141	1.519	1.790	2.135	2.543	..
10. Totale (a prezzi correnti)	344	399	465	554	623	684	788	917	1.168	1.352	1.684	1.867	2.288	2.897	4.055	4.915	6.027	7.323	9.343
11. Totale (a prezzi 1970)	389	444	497	554	581	601	620	609	660	648	677	660	697	732	866	891	952	1.042	1.222
12. Spesa per ReS in % sul Pil	0,74	0,79	0,83	0,88	0,91	0,98	0,88	0,83	0,86	0,86	0,89	0,84	0,85	0,86	1,01	1,04	1,12	1,19	1,36

13. **In questa tabella sono indicati i dati relativi alla spesa italiana in ricerca e sviluppo ripartiti per settore di esecuzione, nel periodo compreso fra il 1967 e il 1985. Le cifre, espresse in miliardi di lire, sono di previsione per quanto riguarda il 1985, di cui non risultano disponibili alcune voci. L'elaborazione della tabella è dell'Isrds su dati Istat.**

Key:
1. Sectors
2. Government
3. State
4. Research organizations
5. Universities
6. Other organizations
7. Companies
8. Public
9. Private
10. Total (at present values)
11. Total (at 1970 values)
12. R&D expenditure as a percentage of GNP
13. This table shows the figures for R&D expenditures in Italy, broken down by sector, for the period between 1967 and 1985. The figures are expressed in billions of lire; the figures for 1985 are estimates since certain items were not available. The table was prepared by ISRDS from ISTAT data.

Italian Participants in ESPRIT

Milan BUSINESS in Italian No 3, Mar 87 pp 25-31

[Excerpts] Companies of all sizes are lining up for the start of the ESPRIT II program. "Giants" with payrolls of thousands, and small companies employing only a few dozen people will present to Europe on a plate the best and most competitive data processing technologies Italy has to offer today.

The prize at stake is not simply the 3 trillion lire that the European Community has tentatively set aside for the program. Participants and candidates alike know that, quite apart from the financial aspect, this opportunity should not be overlooked because it offers possibilities to acquire know-how, to forge advantageous links with other companies, and to make a name for themselves outside the "boot" of Italy. In short, ESPRIT is a chance that must not be lost.

Olivetti, based in Ivrea (estimated sales of about 7 trillion lire in 1986 and a payroll of 49,000): In absolute terms, this company has participated more extensively in the ESPRIT program than any other company in Italy. As prime contractor for 8 of the 24 projects in which the company has participated, which are worth 700 million ECUs allocated by the European Community, Olivetti alone has been awarded 12 percent of all the work involved in the European program. One hundred researchers are involved on a full-time basis in the Olivetti research, which is concerned with factory and office automation, software technologies, artificial intelligence, and the analysis of language for the development of voice communication between man and the computer. The Olivetti research center in Pisa--which operates in close collaboration with

six universities in Italy and fifteen universities in other countries--now devotes its activity almost exclusively to these projects. The Cofide multinational (De Benedetti's financing company) presently is placing great emphasis on the Posa project, in collaboration with Siemens, ICL, and Bull. The objective of this project is to verify the validity of the ODA standard for office documentation and exchanges of this documentation. Companies interested in contacting Olivetti to propose possible agreements are advised to contact the ESPRIT secretariat in Brussels.

SGS, based in Agrate in the province of Milan (sales of more than 4.68 trillion lire last year and a payroll of 9,200): This company is another veteran of ESPRIT. As Mr Giuseppe Zocchi, central research director and the person responsible for SGS participation in ESPRIT, explains, the company took part in four projects in the first phase of the program. Two of these projects were concerned with CAD (Computer Aided Design) support tools, one project with testing methods, and the last one with reliability testing for instrumentation. During this first phase, the partners of the Agrate-based multinational in the various sectors involved were France's Cnel, Honeywell, Bull, British Telecom, Thomson, Matra Harris, the CNR (National Research Council) and several Italian universities. According to Mr Zocchi, the second phase of ESPRIT offers greater opportunities because of the fact that, while the research is still precompetitive as it was in the first phase, it will be more specifically oriented toward subsequent market applications. SGS will be taking part in seven projects which have already been approved, and to which the European Community has allocated a total of 3.961 million ECUs.

Italtel of Milan, which in 1986 had sales of 1.3 trillion lire, with a payroll of 18,000, took part in two projects in the first phase of the program involving CAD systems for VLSI (Very Large Scale Integration) circuits. The person appointed by Italtel, which forms part of IRI group [Institute for the Reconstruction of Industry], to supervise participation in ESPRIT is Maurizio Decina. It is difficult for small companies to join the Italtel team since the type of projects [in which the company is involved] require structures and resources possessed only by large companies, universities, and research centers the size of the Turin-based organization CSELT [Research Center and Laboratories for Telecommunications]. With regard to ESPRIT II, Italtel is now waiting for clarification from Brussels following the opposition of the Germans, French, and British, who are attempting to cut the Community research budget by 50 percent.

However, the ESPRIT banquet is not only for the "big boys." A large number of extremely aggressive and highly competitive smaller companies are either applying for the first time or are re-applying for the second phase of the European venture. A good example here is that of the Viareggio-based company, Delphi, a software house which employs 42 people and which had sales of 8 billion lire in 1986. Having already taken part in two projects in the first phase of ESPRIT, worth a total of 13 million ECUs, Delphi now feels quite at

home in Brussels. Moreover, Delphi has managed to sell the first product to come out of the ESPRIT program, software for the production of expert systems to, of all people, the Japanese.

Since January of this year, the company has been involved in the Aphrodite project, the objective of which is to construct environments for the testing of applications programs. The cost of the 2-year project is 3 million ECUs. While this Viareggio-based company acted as prime contractor in the two projects of the first phase, this time it will be doing research as a partner of Bull, Corus System, Philips France, and the University of Liege for France, and of Ferranti Computer System for Britain. All aspects of the operation are closely followed both by the president of Delphi, Gian Franco Prini, and by Professor Attardi, who is directly responsible for the company's participation in ESPRIT.

We now move from Tuscany to the neighboring region of Emilia, and from a software house to a small industry which produces some of the most advanced robotics systems in the world. This is the Piacenza-based company, Jobs, which has a payroll of 101 and had sales of 20 billion lire in 1986. The Americans have already purchased this company's robots for perforating the wings of the Jumbo, while the Japanese--who at the moment are content to watch them admiringly--probably will purchase some of these systems for applications in the automobile industry.

The president of the company, Armando Corsi, explains that he and his partner, Armando Pagani, are seriously considering the possibility of applying for ESPRIT, obviously in the automation area. The main obstacle is represented by their existing commitments, since participation in the European venture would involve a massive additional workload. Nonetheless, Mr Corsi lets it be understood that ultimately they probably will decide to go for ESPRIT.

Another software house, based in Parma, is the DS Group, which has a payroll of 54 and had sales of 6 billion lire in 1986. The president of the company, Paolo Seletti, recently went to Brussels to present the company's application for telematics networks. The strategy adopted by the Emilia-based company is based on the fact that, for development of this area of activity, the major European manufacturers almost always need small partners who are highly specialized in specific branches of this sector. For this reason, whenever a request of this kind is received by the ESPRIT management in Brussels, the list of available companies are consulted and those companies which are most reliable and most suited to the project are selected. Mr Seletti is certain of one thing, which is that if you know somebody with influence within the Community you have an advantage. It is also advisable to keep abreast of the latest developments in the situation through the EC Official Gazette.

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NEW SGS VLSI LABORATORY, R&D ACTIVITIES OUTLINED

Milan SELEZIONE in Italian No 2, 15 Feb 87 pp 172-174

[Text] The leading role currently played by SGS Microelettronica in research and development for VLSI integrated circuits with submicrometric structures was the main topic of a discussion between the executives of this company of the IRI-STET Group and a select group of journalists from the technical and scientific press during a meeting held at Agrate Brianza on 14 January.

The VLSI Laboratory

All these activities will center on the new VLSI laboratory at Agrate Brianza. Although the structures and plant for this laboratory were planned less than a year ago, they have been completed in record time. Very few other countries have developed laboratories to compare with this one, which is probably the most advanced in Europe.

During the press conference, Mr Raimondo Paletto, general manager of SGS, described the features and structure of the new VLSI laboratory developed by SGS.

The most important features of the new laboratory are the extreme purity of the air in the "class 1" work environments (namely, one 0.2 micron particle per cubic foot) and the total absence of vibration (a displacement of only 5 micron/sec.).

During the visit to the VLSI laboratory, the participants were able to note the extent and complexity of the machinery, the special features incorporated in the load-bearing structures to ensure "class 1" purity, and the total absence of vibration in the work environments (the so-called "clean rooms").

Some Significant Facts

With a covered area totaling 15,000 sq m, the SGS VLSI laboratory is an imposing four-story building. Only the second story from the top is used as the actual work area, with 1,900 sq m and "class 1" cleanliness (that is, 10,000 times cleaner than an operating room).

The other three stories are taken up by equipment designed to ensure a total change of air 10 times a minute, and temperature control with an accuracy of +/- one-quarter of a degree centigrade.

The building has been constructed using special vibration-damping technology to enable scientists to perform photolithographic operations involving geometric values below 0.5 microns.

The water used by the laboratory systems also has an exceptionally high degree of purity, since the number of polluting particles is 100,000 times lower than that of normal drinking water.

The total cost of the fully equipped laboratory will be approximately 100 billion lire, but this figure already is expected to double with the implementation of the second phase of the project.

About 40 billion lire have been spent so far for the implementation of the project, with Italian companies meeting more than 80 percent of these costs.

This is a particularly important step for SGS, which has identified technological progress as one of the key factors to maintain its competitiveness in the world market. For many years SGS has been investing as much as 13 percent of its total sales in research and development, and the company decided to increase its efforts in this direction in 1986, when R&D expenditures reached a peak of 16.3 percent.

Advanced Research at SGS

Mr Giuseppe Zocchi, managing director of the Central Research and Development Department of the SGS Group, gave a rough outline of the main trends today in the field of semiconductors, emphasizing the progressive reduction in the size of the VLSI chip circuit structures (the availability by 1995 of 0.3 micron structures will enable manufacturers to develop 64-Mbit memories). Mr Zocchi also described the main research trends pursued by SGS and the most important collaborative research programs in which SGS currently is involved both in Italy and in the EEC.

Particular emphasis was placed on the remarkable contribution made by SGS, a world leader in microelectronic technologies, to the European programs ESPRIT and EUREKA, as well as to the CNR [National Research Council] finalized project for microelectronics and the National Microelectronics Program.

SGS joined the EEC programs as early as 1981, but it was not until 1985, with the ESPRIT program, that the company began to take an active interest in international collaborative research projects.

The ESPRIT Program

SGS currently is contributing to the ESPRIT program by cooperating in seven large-scale integration and CAD [Computer Aided Design] technology projects.

The returns include a financial contribution to high-risk research, the extension of the frame of reference to a multipartner context, and the creation of new relations with scientists and designers from other countries offering interesting prospects for the training of young researchers.

The EUREKA Program: SGS and Thomson Semiconducteurs Join Forces to Produce 4- and 16-Mbit Nonvolatile Memories

Conducted at an international level, the multimegabit nonvolatile memory project--which has officially been included in the EUREKA program as of 17 December 1986--is a project oriented toward competitive research, and is of outstanding importance both in technological terms and because of the financial commitment involved.

This program, to which SGS and French company Thomson Semiconducteurs are contributing equally, seeks to develop submicrometric CMOS [Complementary Metal Oxide Semiconductor] technologies for the production of 4- and 16-Mbit EPROM [Erasable Programmable Read-Only Memories] memories. The program requires an investment of 1500 man years with a total cost of 400 million ECU's over the next 5 years.

National Microelectronics Program

Given the company's unique position in the sector, it seems only natural that SGS should play a major role in the domestic market, acting as a contractor and a coordinator for the VLSI research projects planned under the National Microelectronics Program.

The program, which was started in 1986, seeks to overcome the traditional lack of contact between universities, research centers and industry through the collaboration of 18 Italian partners in the development of VLSI architectures, technologies, and project methodologies.

CNR Finalized Project

Other activities carried out in Italy include the CNR finalized project for the development of solid state electronic materials and devices, started in December 1986.

SGS is involved in three subprojects focusing not only on the study of VLSI microstructures but also on innovative research in power devices and microelectronic product reliability.

SGS and Thomson Semiconducteurs Join the EUREKA Program for the Development of EPROM Memories

The technical agreement between Italy's SGS (IRI-STET Group) and the French company Thomson Semiconducteurs was made official by the 19 European ministers of the countries participating in the EUREKA project at the Stockholm meeting held on 17 December.

Cooperation between SGS and Thomson will center on the production of 4-Mbit EPROM memories, that is, nonvolatile memories manufactured using CMOS technology and with a design of less than 1 micron (0.8 microns), as well as on a feasibility study for a 16-Mbit EPROM memory with a design of less than 0.5 microns.

The project--the only one of its kind currently being developed in Europe in this field--is expected to take 5 years to complete, at a cost of 200 million ECU's for each partner.

SGS and Thomson are the only two European suppliers of EPROM memories in a world market which, in 1985, was estimated at about $850 million, with Japan and the United States taking equal shares of the greater part of this total. However, while the United States and Japan both are world leaders in the development of high-density memories (256-Kbit and 512-Kbit), the situation is changing rapidly and Japanese idnustry is likely to gain the upper hand.

In 1985, the main fields of application for EPROM memories were the following: 45 percent computers, 38 percent telecommunications, 9 percent industrial market, and 8 percent defense.

Memories are seen as a major driving force behind the development of microelectronic technologies. This project, which is part of the EUREKA program, offers an opportunity to pool financial and intellectual resources in a collaborative research and development effort that will enable European industry to play a significant role in nonvolatile memories. The fields of application of these memories include computers, civil electronics, industrial control systems, robotics, telecommunications, and defense, as well as the recently developed "smart cards."

This market is expected to reach $3 billion in 1990.

Market Penetration by SGS Increases for the Sixth Consecutive Year

In fiscal year 1986--yet another year of crisis for the semiconductor industry worldwide--SGS Microelettronica (IRI-STET Group) had consolidated sales of $375 million, a figure which, for the sixth year running, enabled the company to gain new market shares.

The growth in the company's sales in fact was 3 percent greater than the growth recorded for the world market (20 percent).

The company did particularly well on the European market, where SGS sales totaled $248 million, with 22 percent growth as compared to the mere 15 percent of the market as a whole.

According to the independent estimates supplied by Dataquest Inc., one of the most reliable market research firms in the sector, the Italian company has moved up two positions in the ranks of Europe's leading suppliers and now ranks sixth, surpassing such renowned companies as National Semiconductor Corporation and Intel Corporation.

On the whole, between 1980 and 1986 SGS gained five positions in the European charts and, therefore, did better than any other West European company operating in the sector. What is more, this result was achieved with the company's own resources, without the acquisition of other companies.

8628
CSO: 3698/M217

EC ADOPTS MEASURES FOR INFORMATION TECHNOLOGY STANDARDS

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 449, 11 Feb 87 pp 10-11

[Resolution of the EC Council under the title: "Standardization in the Area of Information Technology"; first paragraph is TECHNOLOGIE NACHRICHTEN introduction]

[Text] The EC Council has decided on a series of measures to promote standardization in Europe, and to develop and implement standards for information technology and functional specifications for telecommunications.

Measures for the Development of Standards in the Area of Information Technology and Telecommunications

1. Goals

a) Contribute to the creation of an internal EC market in information technology and telecommunications.

b) Improve the international competitiveness of EC manufacturers through a higher market potential within the EC for equipment manufactured with accepted European and international standards.

c) Facilitate information exchanges within the EC by reducing obstacles created by incompatibilities resulting from absent or imprecise standards.

d) Meet user's needs by providing more freedom for the composition of their systems assuring compatibility and therefore better performance at lower costs.

e) Promote the application of standards and functional specifications in government contracts.

2. Description of Measures and Operations

2.1 Establishing programs and priorities

Both the EEC requirements and the commercial consequences of these activities from the viewpoints of users, manufacturers, and telecommunications authorities are to be taken into account in the establishment of activity programs and priorities. The work to be done at this level includes, in particular:

2.1.1 Collection of detailed information based on national and international programs, its presentation in a form which allows comparative analysis, and drafting of the summary documents necessary for the work of the commission;

2.1.2 Dissemination of this information, examination of the demand, and consultation with the interested parties;

2.1.3 Timely coordination of activity programs with international standardization activities;

2.1.4 Administrative processing of activity programs;

2.1.5 Compilation of reports on the implementation of activities and on practical application results.

2.2 Implementation of standardization activities in the area of information technology

The implementation of standardization programs requires the development of a number of procedures which are normally delegated to the CEN/CENELEC [European Committee for Standardization/European Electrical Standards Coordinating Committee] and the CEPT [European Conference of Postal and Telecommunications Administrations]. They correspond to the various steps which are necessary to ensure the validity of standards.

This includes:

2.2.1 Refinement of international standards to avoid ambiguities and multiple solutions which contradict the function of a standard which is supposed to assure the exchange of information and the compatibility of systems;

2.2.2 Promulgation of preliminary standards when this is justified by extraordinary delays in the creation of international standards, or the promulgation of EC standards where international standards do not exist;

2.2.3 Stipulation of conditions which must be met as evidence of complete conformity with a standard;

2.2.4 Creation of test standards or test specifications as part of the standards, and the stipulation of methods and structures which enable test laboratories to check compliance with standards on a satisfactory and coordinated basis.

2.3 Activities in the area of telecommunications

Standardization work in the area of telecommunications is concerned with two activities:

--creation of functional specifications based on international or European standards/specifications, when they exist, for the access to public telecommunications networks which offer services that have been specially created for the exchange of information and data between information technology systems. These technical activities correspond to the coordinating actions taken in the telecommunications sector and are assigned to CEPT according to the procedures laid down in 86/361/EEC guidelines.

--Activities in areas common to both information technology and telecommunications which require stronger cooperation between the competent technical organizations (that is, CEN/CENELEC/CEPT). This work must be directed at the utilization of standards and functional specifications in as many applications as possible according to 83/189/EEC guidelines.

2.4 Supplementary Measures

This part of the program contains the following measures:

2.3.1 Specific activities in the area of measuring systems:

--promotion of the development of test and validation tools and of techniques for formal description:

--subsidy of reference applications, particularly where the creation of functional specifications requires the connection of several specifications.

2.4.2 Subsidy for the compilation of guidelines for the application of standards for the end-user.

2.4.3 Subsidy of organizations which demonstrate the degree of systems compatibility that can be achieved by standardization. The main purpose of this measure is to make testing and measuring tools available for the various projects as described in 2.4.1, and to ensure the testing of development standards.

2.4.4 Subsidy of agreements which go beyond the framework of industry standards, depend on agreements between various branches of a profession, and contribute to the efficiency of information exchange (transactions of travel agents, transfer of money, data processing of customs documents, computer aided manufacture, office automation, micro-computer applications, etc.).

2.4.5 The specific investigations and projects for standardization in the area of information technology.

3. Measures in Connection with the Application of Standards in Government Contracts

Identification of the most efficient methods for rapid utilization of the standards and technical specifications created within the framework of this resolution. A suitable connection with the activities within the framework of 77/62/EEC guidelines is required.

Details regarding this resolution are contained in the EEC Official Gazette, Issue L 36/197 and may be obtained free of charge from the editor of TECHNOLOGIE-NACHRICHTEN.

8617
CSO: 3698/M193

USSR INDUSTRIAL FAIR, DATABASE DEMONSTRATION IN FINLAND

Joint Database Agreement Signed

Helsinki HUFVUDSTADSBLADET in Swedish 8 Apr 87 p 16

[Finska Notisbyran report: "Finnish-Soviet Data Bank"]

[Text] A joint electronic export and import data bank will be set up to promote trade between Finland and the Soviet Union. A preliminary protocol has already been signed, and the data bank's capabilities will be demonstrated for the first time at a Soviet trade fair in Helsinki in May.

The Computer Technology Center in Kotka is the Finnish half of the project. On the Soviet side the bank is being developed by V/O Vneshtorgreklama, whose director, Yu. m. Deomidov, announced the plans in Helsinki yesterday.

"We have held intensive negotiations on the project since last year. There will be an electronic data bank that will function reciprocally in Finland and the Soviet Union," Deomidov said.

The Finnish bank will contain data on Soviet import goods, services, patents, and licences, and the Soviet bank will contain the corresponding information for Finland.

The contract covering the establishment and operation of the bank will be signed in the near future, when certain technical problems have been solved. According to Deomidov, both data banks will be in commercial use before the end of the year. He said the plans were being made public now so both sides will be able to begin marketing the data bank. The data will probably be stored on diskettes, but there will be direct real-time links to users

Soviet Industrial Exhibit in Finland

Helsinki HELSINGIN SANOMAT in Finnish 17 Apr 87 p 27

[Text] The Soviet Union will be presenting a cross-section of its industry at its national exhibit in Helsinki in May.

The Soviet economy will use the exhibit to try to market its new, technologically advanced products in Finland. The primary focus of the exhibit will be on those ministries and enterprises, which at the beginning of this year were granted a permission to trade directly with the foreign countries. The major portion of the machines, equipment, devices, and machine tools, etc., indeed comes from the above-mentioned enterprises and ministries.

At the same time the Soviet Union is trying to sell its new patents to the Finns at the fair. There are patents offered within the areas of micro eye surgery, orthopedic methodology, materials with good dryness and friction properties, x-ray technology, and transportation technology, among others. Furthermore, there will be patents offered on methods of improving metal strengths.

Glavkosmos is the third important section, an organization, within whose framework the Soviet Union has started offering space technology services to other countries on a commercial basis. This involves not only the launching of other countries' satellites into their orbits with the Soviet rockets, as an example, but also services such as manufacturing advanced metals in the microgravity of outer space, and the sale of aerospace research results to be used for peaceful purposes.

"In a way it is a kind of exchange exhibit," said Director of Soviet Chamber of Commerce and Industry Yevgeniy Pitogranov in Moscow on Wednesday. "In October there will be a corresponding exhibit going from Finland to Moscow." The Chamber of Commerce and Industry is organizing the Helsinki exhibit.

"We are not operating with the idea that everything we exhibit should be sold. We want to show a cross-section of the Soviet Union as it is the year of the 70th anniversary of the October Revolution."

In connection with the exhibit there will be a trade center, where the Finns can immediately start negotiations concerning purchases, if they want, according to Pitogranov.

During the exhibit the Finns are treated to delicacies of the Soviet kitchen as well as to the Moscow high fashions, coming from the Dom Modi fashion house of the famous fashion designer Vyacheslav Zaytsev.

The idea of the exhibit came up at the meeting of the Soviet Chamber of Commerce in Helsinki a year and a half ago. The exhibit serves to celebrate both the 70th anniversary of Finland's independence, and the 70th anniversary of the October Revolution. There are about 2,000 exhibitors at the fair, which will be open 15-28 May.

CSO:3698/415

FRG PARTICIPATION IN NEW EUREKA PROJECTS OUTLINED

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 447, 17 Jan 87 pp 10-11

[Text] During the Fourth EUREKA Ministerial conference in Stockholm, Germany announced participation in 11 additional projects as part of this technology program. This brings to a total of 31 the number of EUREKA projects in which private companies, research institutes, and even the government participate, with a total investment of DM2.2 billion. Furthermore, 23 of the 31 projects will be subsidized with DM518 million for the period from 1986 to 1993 through the funds for the research ministry's technical programs.

The specific EUREKA projects presented in Stockholm in which the FRG will participate cover the following activities:

JESSI (Joint European Submicron Silicon)

The goal of this joint project, in which an FRG consortium (Siemens, Telefunken Elektronik, EUROSIL, Valvo, and the Fraunhofer Society) is taking part together with the Netherlands firm Philips, is the development of both silicon submicron process technology and an internationally competitive potential in this field with industrial manufacture by the mid-1990's. In the meantime, a "Memorandum of Understanding" has been signed. The cost estimate for the definition phase presently ranges from DM5 to 10 million. This phase will last until May 1987; the whole project will last over 10 years.

DAB (Digital Audio Broadcasting System)

The task of this project is to demonstrate in a reliable way the technical feasibility of a digital, terrestrial broadcasting network and to work out different aspects of the most promising system. A significant result of the work will be a digital broadcasting standard, which will be adopted and distributed among all the participants in the project which will last until 1990. According to an initial estimate, the total costs will be about DM80 million, of which 70 percent will be contributed by the FRG, 21 percent by France, and 9 percent by the Netherlands. Thirteen companies and research institutes from the three countries are involved in the project.

OASIS (Public and Secure Information Systems)

The success of "hackers" who tap information systems is well known. Therefore, the problem of information security urgently requires a comprehensive solution. The project seeks to remedy this problem. An extensive European network with security measures and an "integrated interface" between man and machine is planned. In the FRG, Nixdorf, ANT, and Standard Elektric Lorenz are taking part in the project. The foreign partners are mainly companies from Austria, Britain, and France. No cost estimates have been released yet.

High Quality Voice-CODEX

The conversion from analog to digital technology is in full development in current public telephone networks. Guidelines for voice communication with 64 kbit/s and 32 kbit/s are already available or almost ready. Simultaneously, the demand is rising for voice coding and intermediate bit speed (4 to 16 kbit/s). One of the technical goals of the project is to meet these requirements. A second possible application is the public digital mobile radio. The participants in the EUREKA project are companies and research institutes from the FRG and Portugal. The cost estimate amounts to DM8.5 million over a period of 3 years.

HTS--High Technology Solutions (Translation Support Through Fast Computers)

The goal of this project is the integration of available know-how and technologies in the field of computer assisted translation as well as the development of a new, considerably improved system, which would at least respond to the needs of the EC Commission's translation department. In addition to COS Computer Technology of Saarbruecken, companies from Sweden and the Netherlands are taking part in the project. The total costs have been estimated at about DM3 million. The project will last until 1989.

Factory of the Future

The objective of the project is the development and establishment of pilot projects for computer integrated manufacturing in different industries. The total financial cost amounts to DM36 million. The project will be carried out by numerous participants from the FRG, Switzerland, and France. Up to 70 percent of the FRG contributions allotted to institutes and companies from Baden-Wuerttemberg will be provided by private industry, and the remainder will be supplied by public funds. The project will last 3 years.

Laser Application Association

The project will create an international association in specific sectors of laser application and give considerable EUREKA stimulation through the appropriate concentration of experiences and research. The goal is to undertake product-oriented research for new processing techniques and for process protection, using very powerful lasers which are not yet widely available. Companies and research institutes from the FRG and France are

participating in the project which will cost DM15.7 million (FRG participation: DM8.2 million) and is planned to last 3 years.

Flexible Automated Assembly Systems

This project aims at the elaboration of a preliminary study on the opportunities for European cooperation in this field; the participants in the project come from the FRG, Austria, France, the United Kingdom, Italy, Spain, and Sweden. The results of the preliminary study are expected to be presented to all the EUREKA member states and the EC Commission in the middle of 1987. It will then be the task of industry and research institutes to find partners and cooperative themes to carry out individual projects. The Federal Ministry for Research and Technology [BMFT] has been appointed as the coordinator of the preliminary study for the FRG. Some "300 man-months" are estimated as the cost of the preliminary study. Each participating country provides one-seventh of this amount.

Non-polluting Coal-Fired 300-MW Power Plant

Three important innovations will be developed within the project: the steam generator, which will be a boiler with a fluidized bed furnace; a steam turbine with a titanium final stage, and a super-conductor alternate current RASC [Cryogenic Storage Regulator] regulator. Along with the German companies MAN and LURGI, two French firms are participating in the project. The total cost of the project until the opening of a first prototype power plant is estimated at about DM350 million. The project is to be carried out by the end of 1990.

EUROCARE (European Project for Conservation and Restoration)

The goal of the project, in which the FRG (Oldenburg University) and Austria are the major participants, is the development of industrial products and technologies not currently available as well as artistic means for conservation and restoration possibilities on a scientific basis and the introduction of improved technical standards and European guidelines for the evaluation and treatment of objects. The project will last about 12 years. A cost estimate is not yet available.

Super-Subsea

The basic idea of this project is the development of standardized parts for an underwater production system. It also envisions using "operation techniques" on the basis of manned autonomous submarines. In addition to Thyssen Nordseewerke Emden, a Norwegian company is taking part in the project. The schedule projects 5 years before the operational phase begins. The costs of development, testing, and marketing of the total Super Subsea System are estimated at about DM30 million.

8613
CSO: 3698/M170

ITALIAN MINISTERIAL RESOLUTIONS APPROVE INDUSTRIAL RESEARCH SUBSIDIES

Firms Listed

[Editorial Report] Rome GAZZETTA UFFICIALE DELLA REPUBBLICA ITALIANA in Italian on 28 March and 3 April 1987 publishes resolutions adopted by the Interministerial Committee for the Coordination of Industrial Policies [CIPI] and the Ministry for Scientific and Technological Research [MRST] concerning the admission of Italian industrial research projects to the Special Fund for Applied Research. The following records from the 28 March and 3 April issues of the GAZZETTA identify the companies admitted to the fund, the fields of research, and the terms of financing for government sponsorship:

CIPI Resolution of 12 February 1987

Rome GAZZETTA UFFICIALE DELLA REPUBBLICA ITALIANA in Italian 28 Mar 87 p 35

Aeritalia Societa' Aerospaziale Italiana S.p.A., (large firm classification).
Object of research: Applications of composite ceramic materials to turbine motors;
Admission validity: (Art. 16 Law No 46/82): decision of the Minister of Trade and Industry, 31 October 1986.
Place of research: Naples.
Form of Financing: Credit available at the annual rate of interest provided by decree of the minister of the treasury, Art. 15, Law 17, 17 February 1982, No 46.
Contribution according to Para. 3, Art. 15, Law of 17 February 1982, No 46.
Maximum amount:
a) Credit available: 27.5 percent of allowed costs, equal to 1,687,345,000 lire;
b) Contribution: determined by the Minister for Trade and Industry, on the date of stipulation of the contract according to Art. 16, Law No 46/82, on the basis of 27.5 percent of allowed costs, applying the calculation procedure of Art. 15 of the above law.
Amortization: 10 years amortization over the period of utilization and preamortization from the date of stipulation of the contract.
Initial date of program: 1 January 1986.
Expected completion date: 31 December 1992.

Aeritalia Societa' Aerospaziale Italiana S.p.A. (large firm classification)
Object of research: Amphibious aircraft for the protection of the environment, patroling, and transportation.
(Art. 16, Law 16, No 46/82).

Place of research: Naples.
Form of financing: Credit available at the annual rate of interest provided by decree of the Minister of the Treasury.
Contribution according to Para. 3, Art. 15, Law of 17 February 1982, No 46.
Maximum amount: Credit available: 27.5 percent of allowed costs, equal to 2,010,992,000 lire.
Contribution: determined by the Minister for Trade and Industry on the date of stipulation of the contract according to Para. 3, Art. 16, Law No 46/82, on the basis of 27.5 percent of allowed costs, with the application of the calculation procedure of Art. 15 of the above law.
Amortization: 10 years over the 5-year period of utilization and preamortization from date of stipulation of the contract.
Initial date of program: 1 January 1987.
Expected completion date: 31 July 1988.

Aeritalia Societa' Aerospaziale Italiana S.p.A., (large firm classification)
Object of research: Eurofar project.
Admission validity: Decision of the Minister for Trade and Industry (Art. 16, Law No 46/82) on 31 October 1986.
Place of research: Naples.
Form of financing: Credit available at the annual rate of interest provided by decree of the Minister of the Treasury.
Contribution according to Para. 3, Art. 15, Law of 17 February 1982, No 46.
Maximum amount:
a) Credit available: 27.5 percent of allowed costs, equal to 1,207,500,000 lire;
b) Contribution to be determined by the Minister for Trade and Industry, on the date of stipulation of the contract according to Para. 3, Art. 16, Law No 46/82 on the basis of 27.5 percent of allowed costs, applying the calculation procedure of Art. 15 of the above law.
Amortization: 10 years, over the 5-year period of utilization and preamortization from the date of contract.
Initial date of program: 2 July 1986.
Expected date of completion: 31 December 1990.

Aeritalia Societa' Aerospaziale Italiana S.p.A. (large firm classification).
Object of research: Innovation, automation and integration of technical production processes and associated data processing methodologies.
Admission validity: Decision of the Minister for Trade and Industry (Art. 16, Law No 46/82) on 31 October 1986.
Place of research: Naples.
Form of financing: Credit available at the annual rate of interest provided by decree of the Minister of the Treasury.
Contribution according to Para. 3, Art. 15, Law of 17 February 1982 No 46.
Maximum amount:

a) Credit available: 27.5 percent of allowed costs, equal to 29,650,225,000 lire;
b) Contribution determined by the Minister for Trade and Industry on the date of stipulation of the contract according to Para. 3, Art. 16, Law No 46/82, on the basis of 27.5 percent of allowed costs, applying the calculation procedure of Art. 15 of the above law.
Amortization: 10 years, over the 5-year period of utilization and preamortization from the date of contract.
Initial date of program: 1 January 1986.
Expected date of completion: 31 December 1992.

MRST Resolution of 13 March 1987

Rome GAZZETTA UFFICIALE DELLA REPUBLICA ITALIANA in Italian 3 Apr 87 pp 50-53

Aeritalia--Societa Aerospaziale Italiana S.p.A., Naples, (large company classification).
Place of execution: Northern Italy
Program: Pods for navigation and night attack (File No 47858).
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy. Maximum amount:
a) 2,929 million lire in the form of easy credit, not to exceed 35 percent of one-third of the allowed costs of 25,107 million lire;
b) 2,929 million lire subsidy, not to exceed 35 percent of one-third of the allowed costs of 25,107 million lire.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 13 January 1986.
The above award is subject to verification by the MRST that duplicative financing by the Ministry of Defense does not exist.

CSELT--Centro Studi E Laboratori Telecommunicazioni S.p.A., Turin;
Italtel--Societa Italiana Telecommunicazioni S.p.A., Milan;
SIP--Societa Italiana Per L'Esercizio Delle Telecommunicazioni S.p.A., Turin;
Sirti S.p.A., Milan (large company classification).
Place of execution: Northern Italy.
Program: Technology and advanced systems for optical communications: distributed broadband optical networks (File No 41883).
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 7,847 million lire in the form of easy credit, not to exceed 35 percent on one-third of the allowed costs of 67,268 million lire;
b) 7,847 million lire subsidy, not to exceed 35 percent of one-third of the allowed costs of 67,268 million lire.

Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1985.
The above award is subject to approval by the EC Commission.

Italtel--Societa Italiana Telecommunicazioni S.p.A., Milan, (large company classification).
Place of execution: Northern Italy.
Program: Transformation of UT lines into integrated numerical networks for technology and services (File No 47983).
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 21,124 million lire in the form of easy credit, not to exceed 35 percent of one-third of the allowed costs of 181,070 million lire;
b) 21,124 million lire subsidy, not to exceed 30 percent of one-third of the allowed costs of 181,070 million lire.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 March 1986.
Special conditions: A quarantee by STET--Societa Finanziara Telefonica per Azioni, Turin; Financing for the "public telephony" sub-class (with allowed costs of 6,335 million lire) is subject to establishment of standards by the contractor within the time limit of the contract with IMI [Italian Institute for the Financing of Small and Medium-Size Companies], and to an agreement with the supplier of terminals guaranteeing that Italtel-Sit will have available public telephones within the time limits and with features compatible with the proposed research.
The above award is subject to approval by the EC Commission.

Olteco--Olivetti Telecommunicazioni S.p.A., Ivrea (Turin), (large company classification).
Place of execution: Northern Italy.
Program: Interconnected and integrated systems for office automation (File No 45436).
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 4,926 million lire in the form of easy credit, not to exceed 35 percent of

one-third of the allowed costs of 42,228 million lire;
b) 4,926 million lire subsidy, not to exceed 35 percent of one-third of the allowed costs of 42,228 million lire.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years.
Amortization: Sexteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 April 1985.
The above award is subject to approval by the EC Commission.

The following projects will receive further financing from the Special Fund for Applied Research under the terms of the aforementioned laws. The size of these awards and the related terms and conditions are specified for each project:

Aeritalia--Societa Aerospaziale Italiana S.p.A., Naples, (large company classification).
Place of execution: Northern Italy.
Program: Air defense aircraft (File No 43376; last part).
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 3,946 million lire in the form of easy credit, not to exceed 40 percent of one-third of the allowed costs of 25,590 million lire;
b) 3,946 million lire subsidy, not to exceed 40 percent of one-third of the allowed costs of 25,590 million lire.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1983.
The above award is subject to approval by the EC Commission.

Aeritalia--Societa Aerospaziale Italiana S.p.A., Naples, (large company classification).
Place of execution: Southern Italy.
Program: Medium advanced aircraft (File No 48095; last part).
Previous resolution: MRST, 23 December 1986.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount: 8,586 million lire in the form of easy credit, not to exceed 40 percent of one-half of the allowed costs of 42,928 million lire. The project has now been completely financed.

Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 April 1986.
The above award is subject to approval by the EC Commission.

Aeritalia--Societa Aerospaziale Italiana S.p.A., Naples, (large company classification).
Place of execution: Southern Italy.
Program: Primary aeronautical structures in composite materials (File No 48205; last part).
Previous resolution: MRST, 23 December 1986.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount: 9,401 million lire in the form of easy credit, not to exceed 40 percent of one-half of the allowed costs of 47,005 million lire. The project has now been completely financed.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 May 1986.
The above award is subject to approval by the EC Commission.

Fiat Auto S.p.A., Turin; Fiat Veicoli Industrial S.p.A., Turin, (large company classification).
Place of execution: Northern Italy.
Program: Innovative systems for industrial technology (File No 40940, last part).
Previous resolutions: CIPI, 22 December 1982; MRST, 28 April 1983, 27 March 1985, 31 January 1986, 25 July 1986
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 3,550 million lire in the form of easy credit, not to exceed 30 percent of 15 percent of the allowed costs of 78,870 million lire;
b) 3,550 million lire subsidy, not to exceed 30 percent of 15 percent of the allowed costs of 78,870 million lire.
Duration: Nine-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Eighteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The

first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1982.

Fiat Auto S.p.A., Turin, (large company classification).
Place of execution: Northern Italy.
Program: Advanced design subsystems for industrial vehicles: new diesel engines and combustion control systems (File No 41052, last part).
Previous resolutions: MRST, 29 July 1983, 27 March 1985, 31 January 1986.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 2,256 million lire in the form of easy credit, not to exceed 20 percent of 20 percent of the allowed costs of 56,410 million lire;
b) 3,385 million lire subsidy, not to exceed 30 percent of 20 percent of the allowed costs of 56,410 million lire.
Duration: Nine-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Eighteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1982.

GTE Telecommunicazioni S.p.A., Cassina de Pecchi (Milan); Telettra--Telefonia Elettronica E Radio S.p.A., Milan (large company classification).
Place of execution: Northern Italy.
Program: New design numeric radio links for integrated networks (File No 42603, third part).
Previous resolutions: MRST, 31 January 1986, 21 May 1986, 25 July 1986.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 3,029 million lire in the form of easy credit, not to exceed 40 percent of 1/6 of the allowed costs of 45,434 million lire;
b) 3,029 million lire subsidy, not to exceed 40 percent of 1/6 of the allowed costs of 45,434 million lire. Five sixth of the project has now been financed.
Duration: Nine-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Eighteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 September 1982.

Italtel--Societa Italiana Telecommunicazioni S.p.A., Milan, (large company

classification.
Place of execution: Northern and Southern Italy.
Program: Devices and transmission systems for integrated networks (File No 43374).
Previous resolution: MRST, 30 October 1986.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 6,775 million lire in the form of easy credit, not to exceed 35 percent of one-third of the allowed costs of 58,073.2 million lire to be allotted to the northern share;
b) 6,775 million lire subsidy, not to exceed 35 percent of one-third of the allowed costs of 58,073.2 million lire to be allotted to the northern share;
c) the southern share of the allowed costs of 7,498.8 million lire has already been financed.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 7 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1985.
The above award is subject to approval by the EC Commission.

Italtel--Societa Italiana Telecommunicazioni S.p.A., Milan, (large company classification).
Place of execution: Northern and Southern Italy.
Program: Operation, maintenance, and management network for telecommunications--first part (File No 45995; second part).
Previous resolution: MRST, 30 October 1986, 25 February 1987.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount: 2,170 million lire in the form of easy credit, not to exceed 70 percent of one sixth of the allowed costs of 18,600.7 million lire to be allotted to the northern share. One half of the northern share of the project has now been financed and the southern share is completely financed.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 January 1985.
The above award is subject to approval by the EC Commission.

Italtel--Societa Italiana Telecommunicazioni S.p.A., Milan (large company classification).

Place of execution: Northern and southern Italy.
Program: Export-oriented development of the UT line (File No 47984).
Previous resolution: MRST, 23 December 1986.
Form of financing: Credit available at a annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 8,109 million lire in the form of easy credit, not to exceed 35 percent of one-third of the allowed costs of 69,509.7 million lire to be allotted to the northern share;
b) 8,109 million lire subsidy, not to exceed 35 percent of one-third of allowed costs of 69,509.7 million lire to be allotted to the northern share;
c) the southern share of allowed costs of 48,733.4 million lire has already been financed.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 March 1986.
Special conditions: A guarantee from STET--Societa Finanziara Telefonica per Azioni, Turin
The above award is subject to approval by the EC Commission.

OCN S.p.A., Marcianise (Caserta); OCN Sistemi S.p.A., Ivrea (Turin); Esercizio Pietro Pontiggia PPL S.p.A., Ivrea (Turin), (large company classification).
Place of execution: Northern and southern Italy.
Program: Development of operating units, management methods, and system architecture for manufacturing automation (File No 44867, second part).
Previous resolution: MRST, 23 December 1986, 25 February 1987.
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 1,978 million lire in the form of easy credit, not to exceed 35 percent of one-third of the allowed costs of 16,957 million lire to be allotted to the northern share;
b) 1,978 million lire subsidy, not to exceed 35 percent of one-third of allowed costs of 16,957 million lire to be allotted to the northern share. Two thirds of the northern share of the project has now been financed and the southern share is completely financed.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years and 10 months.
Amortization: Sixteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.

Starting date of program: 1 March 1984.
Special conditions: A guarantee from Ing C. Olivetti & C. S.p.A., Ivrea (Turin).
The above award is subject to approval by the EC Commission.

SGS--Microelecttronica S.p.A., Catania, (large company classification).
Place of execution: Northern Italy.
Program: MOS LSI-VLSI integrated circuits, analog and analog-digital integrated circuits, discrete components, and integrated circuits with technological potential (File No 41864; fourth part).
Previous resolution: MRST, 5 July 1985, 31 January 1986, 25 July 1986
Form of financing: Credit available at an annual interest rate established by a decree of the treasury minister; subsidy.
Maximum amount:
a) 13,507 million lire in the form of easy credit, not to exceed 40 percent of 15 percent of the allowed costs of 225,131 million lire;
b) 13,507 million lire subsidy, not to exceed 40 percent of 15 percent of allowed costs of 225,131 million lire. Eighty-five percent of the project has now been financed.
Duration: Nine-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Eighteen, semi-annual, equal-deferred installments to be paid at the end of each 6-month period, inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of program: 1 February 1983.
Special conditions: A guarantee from STET--Societa Finanziaria Telefonica per Azioni, Turin.

8615
CSO: 3698/M239

BRIEFS

NEW FRG RESEARCH PROJECTS--Thirteen new Special Research Sectors (SFB) are presently being set up in German universities in biology, natural sciences, and engineering following a decision of the Authorizing Committee of the German Research Society (DFG). In the biology SFB "Molecular Principles of the Biogenesis of Cell Organelles" (Munich), scientists are working toward a better understanding of the formation, reproduction, and sustenance of cell organelles in the so-called eukaryotic cells. The development of new economically and environmentally acceptable models and projects for agricultural activities is the goal of the SFB "Environmentally Acceptable Use of Agricultural Lands" (Hohenheim). In the new SFB "Energy and Load Transfer in Molecular Aggregates" (Berlin), the study focuses on a largely unexplained problem in physics with possible fundamental significance for solid state and materials research. In the SFB "Nonlinear Dynamics: Instabilities and Structure Formation in Physical Systems" (Frankfurt/Darmstadt), the study seeks an understanding of general laws of nonlinear phenomena, a current focus of interest in many sectors of physics, engineering, and mathematics. The following SFB's have been established in engineering: "Production Techniques for Components Made From Nonmetallic Fiber Composites" (Aachen); "Maximum Frequency and Maximum Speed Circuits in III-V Semiconductors" (Duisburg); and "Multiprocessor and Network Configurations" (Erlangen). Production techniques for highly stressed machine elements and precision parts will be developed in Aachen. The objective of the Duisburg SFB is to improve so-called monolithically integrated circuits for analog technologies in the micron and millimeter wave sector, to be used, for example, in telecommunications or radar technology. A particularly topical sector in computer science, namely, communications of computers with several processors and in computer networks, will be studied at Erlangen. [Excerpts] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 447, 17 Jan 87 p 6] 8613

EC MEASURES AGAINST 'BRAIN DRAIN'--The developing countries are not the only ones affected by the migration of brainpower to the United States. The 12 EEC member states also constantly lose scientists and engineers to the United States. Italian European Parliament deputy Giovanni Starita recently called for EC Commission measures to stop this trend. As a case in point, he referred to an Italian research team which emigrated to the United States because it could not find enough support in Europe for its improved X-ray laser. The EC Commission believes that the creation of a European Community of Technology could provide a remedy to this situation since it would reinforce EEC research and development policy. The Commission's action plan

for 1985-88, which aims at laying the foundation for a "Europe of Scientific Research," is of special significance in this connection. This plan fosters cooperation without borders among teams and researchers. Since its launching in 1985, such cooperation has been established in a total of 235 projects involving 750 research centers. However, according to the Commission, pending applications for financial support far exceed available funds for this program (60 million ECU). [Excerpts] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 448, 29 Jan 87 p 14] 8703

CSO: 3698/M186

FRG-PRC INFORMATION EXCHANGE

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 448, 29 Jan 87 p 10

[Excerpts] To improve the exchange of printed and electronic technical information between the FRG and the PRC, an agreement was reached in May 1986 between the BMFT [Federal Ministry for Research and Technology] and the PRC State Committee for Science and Technology for exchange of research information and documentation between the two countries.

For users in the FRG, the following specialized fields, for which China has achieved international recognition, are of particular interest:

--Biotechnology, biochemistry, genetic engineering;
--Health, medicine (acupuncture, microsurgery), folk medicine;
--Agriculture, natural science (insect control, plant research);
--Physics (development of laser physics, nuclear physics, plasma physics);
--Astronautics.

The negotiating partner in China is the Institute of Scientific and Technical Information of China (ISTIC), Beijing. The Technical Information Center in Karlsruhe is cooperating with several Chinese technical information institutes in the production of databases, particularly in the fields of nuclear research, nuclear engineering, renewable energy sources, aeronautics and astronautics, physics, mathematics, and computer science. With regard to the translation of literature in Chinese, translators are available in China and in the FRG to work on a fee basis. A list of translators may be obtained from the international office of GID [Society for Information and Documentation]. Upon request, the Technical Information Library in Hannover will make inquiries about translations of Chinese publications which are already available.

8701
CSO: 3698/M184

BRIEFS

FINNISH AUTOMATION TECHNOLOGY TO USSR--The Factory Automation Department of Valmet Oy transportation equipment group has sold to the Soviet Union a lath turning manufacturing system. The value of the supply agreement is over 10 million markkas. The portal robots that are part of the agreement are manufactured at the Linnavuori plant, the equipment for high storage and transportation at the Tampere plant. The automation components of the production cell are to be delivered to the customer by the end of the year. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 22 Apr 87 p 25]

CSO: 3698/415

ACTIVITIES OF POLISH SPACE RESEARCH COMMITTEE

History, Future Plans

Warsaw ASTRONAUTYKA in Polish No 1, 1987 pp 2-3

[Article by Magda Sowinska: "Nearly Everything About the Space Research Committee"]

[Text] [Biographical Inset] Professor Jan Rychlewski, Chairman of the Space Research Committee

Professor Rychlewski is a specialist in continuum mechanics. Born on 23 May 1934 in Moscow, he is married and has one child. Education: Warsaw Polytechnic, 1958; Warsaw University (Mathematics), 1961. Academic degrees: Ph. D., 1964, Habilitated Ph.D., 1965; Extraordinary Professor, 1970; Full Professor, 1986. Corresponding Member of the PAN [Polish Academy of Sciences] since 1973.

Activities: Research Associate of the Institute for Basic Problems of Technology, PAN, Secretary of the PAN's Department of Mathematical, Physical, and Chemical Sciences during 1977-1981; Member of the Presidium of the Central Certifying Commission for Academic Personnel under the Chairman of the Council of Ministers, 1974-1980; Chairman of the Academic Council at the Swierk Institute of Nuclear Research, 1978-1981; Deputy Director of the Science and Education Department under the PZPR Central Committee during 1972-1978; former member of the PAN Presidium.

Since 1978 Prof Rychlewski has been chairman of the Space Research Committee under the PAN Presidium, and since 1985, chairman of the Committee for Peace Research, PAN. He is a member of the Committee for Science and Technology Progress under the Council of Ministers.

Prof Rychlewski is a member of the PZPR.

Leisure time activities: tennis and kayak boating. He has successfully stopped smoking.

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On 25 January 1966 the Presidium of the Polish Academy of Sciences had established the Committee for Research Into and Peaceful Utilization of Outer Space (KBiPWPK), entrusting to it the function of organizing domestic research and acting as the Polish agency coordinating international cooperation in this field.

The membership of that Committee during its first term of office in 1966-1968 had included: the chairman, the prominent astrophysicist Professor Stefan Piotrowski; the deputy chairmen Michal Lunc and Wlodzimierz Zonn; the members -- Wladyslaw Barcikowski, Zdzislaw Kaczmarek, Konrad Kozlowski, Franciszek Misztal, Tadeusz Niewiadomski, Witold Nowacki, Wladyslaw Parczewski, and Julian Walawski, and the secretary, Ludoslaw Cichowicz. It drafted the first Polish program for space research, which outlined the scope and directions of the research on taking into acocunt scientific traditions and the scale of our contemporary and future needs and possibilities. Underlying the decisions determining Poland's participation in space research were the following premises (let us remember that this was in 1966):

-- In the field of meteorology, communications, geodesy, and navigation, space technologies will become in the immediate future standard tools of work which we, like other countries, will be compelled to employ owing to technological and economic considerations.

-- Every country should have a group of experts who can opine on the problems arising in connection with the development of space research and assess the practical advantages ensuing from that research.

-- The expansion of the knowledge of outer space, and chiefly of circumterrestrial space, which we want to exploit for our own needs, is indispensable to a comprehensive study of our environment -- the Earth.

-- We cannot deprive ourselves of the opportunities harbored in the practical application of the results of the interdisciplinary research represented by space research.

It was found that during its first stage the space research program should promote a dynamic development of basic fields of knowledge about outer space. That was why the greatest interest had been focused on space physics, representing the basis for space research and technologies. It is worthwhile to recall the topics of the research then undertaken. In 1967 the Space Physics Section of the KBiPWPK reported on research into, among other things, the electrical parameters occurring in the presence of interaction between an artificial satellite and the environment at altitudes of from 100 to 500 km, and on measurements of heat flux in a motionless gaseous medium in conditions of weightlessness. And the Section on Space Medicine and Biology had engaged in research into vegetative responses in weightlessness and the responses of the human organism to perturbations in the ventilation of the space-vehicle cabin. Was it expected at the time that so-called Polish specialties would arise within the framework of the Interkosmos program, and that not only equipment designed and built by our scientists but also the first Polish cosmonaut would engage in the conquest of space?

In the course of the 20 years of its existence the Committee had been chaired by: Prof Stefan Piotrowski, during 1966-1971; Prof Dionizy Smolenski, 1972-1974; and then again Prof Stefan Piotrowski, 1975-1977. Since 1978 the incumbent chairman has been Prof Jan Rychlewski.

In January 1978 the KBiPWPK was renamed the Space Research Committee.

Within the Committee operate the following special subcommittees (the names of their chairmen during the 1984-1986 term of office are enclosed in parentheses): Space Physics (Prof Stanislaw Grzedzielski); Satellite Geodesy (Docent Janusz Zielinski); Space Meteorology (Prof Jan Zielinski); Space Biology and Medicine (Prof Stanislaw Baranski); Remote sensing (Prof Bogdan Ney); Space Communications (Prof Andrzej Zielinski). Recently there was established the Section on Space Law, whose activities are directed by Prof Andrzej Wasilkowski. Preparations continue to isolate from the Subcommittee on Space Physics the Specialized Section on the Technology of Materials in Space, which will be chaired by Prof Robert Galazka. All the abovementioned scientists, as well as Prof Jan Rychlewski, Colonel (retired) Pilot-Cosmonaut of the PRL [People's Republic of Poland] Miroslaw Hermaszewski, and Scientific Secretary of the Space Research Committee Docent Zbigniew Sarol, are members of the Presidium of the Space Research Committee.

The Space Research Committee represents Poland on the international arena. Our cooperation with foreign countries in space research is not limited to the Interkosmos alone, although, as stressed by Prof Rychlewski, precisely that contact enables us to have real access to space technologies. In addition to cooperating with the Space Research Institute of the USSR Academy of Sciences and about 15 other Soviet research centers and affine institutions in the socialist countries, the Space Research Committee exchanges experience with scientists from Western countries. Of course, financial considerations preclude Poland's direct participation in the space research conducted by these countries, but Polish scientists are taking indirectly part in the experiments. Many persons are moreover on sponsored research and study trips abroad. The Committee maintains contact with, among others, Bonn University and the Max Planck Institute in the FRG, the Graz Polytechnic in Austria, the Kirun Space Research Center in Sweden, and the Space Laboratory in Toulouse, France.

Highly important also is the Committee's participation in the work of international organizations: the Astronautics Federation and the COSPAR. The International Astronautics Federation is, as known, a very manysided organization which deals with a range of problems similar to that of the Space Research Committee -- both science and technology as well as medicine and space law are represented. In its turn, the COSPAR is a specialized organization for professional researchers, as Prof Rychlewski put it. During its session the COSPAR discusses only science, without dealing with problems of space technology.

The Polish delegations always are extremely active, presenting a number of papers and participating in plenary discussions. An acknowledgment of the achievements and high scientific level of the work conducted in Poland is of a certainty represented by the election of Prof Stanislaw Grzedzielski to the

Executive Committee of the COSPAR during the recent congress of that organization in July 1986. In the years 1982-1984 we also had our representative at the IAF -- during that period Prof Jan Rychlewski was a vice chairman of the Federation. The Space Research Committee represents Poland on the United Nations forum. Polish scientists participate in the work of the United Nations Committee for Research Into and Peaceful Utilization of Outer Space -- in both of its subcommittees -- Legal and Scientific-Technical. The Space Research Committee took part in the discussion of the Treaty Concerning the Moon and Other Celestial Bodies, of the principles for disseminating information from satellite photographs, and recently of problems of the militarization of space. Poles took an active part in the Second United Nations World Conference on Space Research and Utilization, which took place in 1982.

"We're keeping our hand on the pulse," said the Committee Chairman Prof Jan Rychlewski. "Participating in international seminars, conferences, and symposia is not just a question of comparing our research with that being done at world's leading centers, and it does not reduce either to exchange of research experience. We're keeping track of development trends in discrete fields relating to space research and attempting to orient the activities of our Committee in conformance with these trends."

For several years now the Committee has been promoting a better and more complete utilization of the nascent Polish specializations in space research. Wave processes, physics of neutral particles in cosmic plasma, calculations of satellite orbits, determination of loci on Earth's surface, Doppler techniques in applied geodesy, research into sanitary state of forests from the aviation ceiling, techniques for the study and charting of terrain utilization, dynamic studies of blood circulation, and techniques and instruments for research into electromagnetic waves in the microwave region, are just some of the more important "Polish" research topics.

When asked about the accomplishments of the Space Research Committee, Prof Jan Rychlewski pointed to not only the already broadly discussed achievements made during the flight in space by Col Miroslaw Hermaszewski and the participation of Polish scientists in preparing and carrying out the Vega Mission, but also the following: in satellite geodesy, the development of a laser-based remote sensor serving to measure distance to satellites correct to the order of 20 cm; in communications, the opening of the experimental "testing ground" in Dubna; in medicine, apparatus sets, and primarily the Fizjotest facility for the monitored training of cosmonauts and investigation of their physical capacities, which will be permanently installed in the Mir Orbiting Station. As regards space technology, preparations are under way and the experiment designed by the Lodz Polytechnic has reached a highly advanced stage -- this refers to the apparatus designed to observe the behavior of fluids in conditions of weightlessness, which is highly valued by the Interkosmos and has chances for being inserted into an orbit.

But there also have been failures. The interesting Didex experiment, intended to assist in determining the decay of the Earth's gravitational field, was discontinued.

The Committee's plans for the immediate future include participation in Operation Phobos (we wrote about that mission in ASTRONAUTYKA, No 4, 1986 -- M.S.) and the conduct of active plasma experiments in space. Considerable hopes also are linked to the anticipated intensification of research work in the new Mir Orbiting Station. It can be expected that the Polish Telegwiazda will become a standard part of the equipment of Soviet spaceships. Work is continuing on ground equipment for direct satellite television (it is expected that low-cost mass equipment for receiving programs of this type will be accessible in the early 1990's). A system for continuous remote-sensing servicing of agriculture, forestry, and geology is being created.

Structure, Organization

Warsaw ASTRONAUTYKA in Polish No 1, 1987, pp 4,5

[Article by (L.): "Ten Years of the Space Research Center, Polish Academy of Sciences"]

[Text] In Poland the whole of space research is overseen by the Space Research Committee, a body of the Polish Academy of Sciences. It organizes domestic research and represents Poland abroad. As for the implementation and coordination of that research, they are handled by the Space Research Center, PAN, established in February 1977.

The Center was organized by merging and expanding the laboratories and research groups which already in the past had engaged in space research at other institutes. A major form of research program at the CBK (Space Research Center) is research into plasma, the ionized gas existing in circumterrestrial space as well as in space around other planets of our Solar System, and especially around the Sun.

The CBK contains four departments and two laboratories. The departments are: the Department of Space Physics, the Department of Planetary Geodesy, the Department of Space Technology, and the Department of Celestial Mechanics, and the laboratories are the Astronomical Latitudinal Observatory in Borowiec (Department of Planetary Geodesy), and the Laboratory of Sun-Earth Relations in Wroclaw (Department of Space Physics). The Space Research Center conducts and coordinates research into: space physics (including the physics of the Earth's upper atmosphere), heliophysics, satellite geodesy, geodynamics, design of instruments for remote sensing and data processing, and celestial mechanics. The CBK cooperates with many other research centers in this country, including the Institute of Aviation, the Military Communications Institute, Poznan University, Wroclaw University, Warsaw Polytechnic, Institute of Geophysics PAN, and Institute of Mathematical Machines. It engages in broad scientific cooperation with CEMA countries under the Interkosmos program, as well as with, among others, centers in France, Austria, the FRG, and the United States. In addition, the CBK participates in the program concerning the geodynamics of Poland's territory and cooperates with the commissions and working groups of the International Committee for Space Research -- COSPAR, the International Geophysics and Geodesy Union, and also the International Astronomy Union.

Department of Space Physics

This department was formed from three research groups: the Ionospheric and Circumterrestrial Space Physics Laboratory of the Institute of Geophysics, PAN; the Ionospheric Physics laboratory of the Geophysical Observatory of the Institute of Geophysics, PAN; and the Earth-Sun Relations Laboratory of the Department of Astronomy, PAN.

The Department of Space Physics operates three laboratories: the Laboratory of Physics of the Upper Atmosphere and Ionospheric Physics, the Laboratory of Physics of the Magnetosphere and the Solar System and Astrophysics, and the Laboratory of Earth-Sun Relations. It engages in research with the object of exploring the physical structure and processes occurring in circumterrestrial and circumplanetary space as well as on the Sun. This research focuses on the ionosphere, the magnetosphere, and the heliosphere, the interaction between the heliosphere and the interstellar medium, and the x- and shortwave radiation of the Sun.

The Department's activities are of a threefold nature: experimental, building appropriate equipment and performing measurements, both ground-based and with the aid of rockets and artificial satellites; interpretive, interpreting the measurements performed at the Department and at the foreign centers with which contacts exist; and theoretical, designing physical models of the phenomena occurring in outer space. The work on the theory of models of the magnetosphere and the theory of the scintillation of the radio waves emitted by artificial Earth satellites has won distinction, and its authors received in 1975 the Team Prize of the Scientific Secretary of the PAN, and in 1977 the Prize of the Third Department of the PAN.

As part of the Interkosmos program, the results of measurements of photoelectron beams performed on Kosmos-261 and Kosmos-348 satellites were interpreted. The Department participates in coordinated measurements of integral electron concentration with the aid of radio signals from satellites of the network of measurement stations.

As regards research into the heliosphere and its interaction with the interstellar medium, it has chiefly been focused on effects of the concentration of neutral gases, effect of solar activity on the feedback between the solar wind and interstellar matter, and the shape of the heliosphere in the presence of the external medium flowing around it. In addition, instruments for investigating neutral gases in interplanetary space were built. As regards research into the shortwave x-radiation of the Sun, this concerned interpreting the related measurements (performed with the aid of rockets and satellites) -- a project closely linked to the Interkosmos program, preparing a satellite x-ray photometer, and participating in the construction of a satellite UV telescope.

Department of Planetary Geodesy

This Department operates three laboratories: Saetellite Geodesy, Geodetic Physics, and the Astronomical Latitudinal Observatory. It does research into the shape and rotational movement of the Earth, which comprises the following

domains: satellite geodesy, rotational movement of the Earth, and tidal movements of the earth's crust. As part of international cooperation programs, this Department conducts classical astronomic, geodetic, photographic, and laser observations of artificial Earth satellites and constructs unique equipment for these purposes. Its interpreting work includes: own observations and those obtained from other cooperating centers, and work on theory such as improvements of data processing techniques and development of the theory of the phenomena investigated.

In the field of satellite geodesy the work under way concerns the following topics: determination of the coordinates of satellite stations by geometrical and dynamic methods; analysis and numerical application of satellite techniques; determination of the shape of the Earth; construction and application of laser (remote-sensing) and Doppler instruments for observing artificial Earth satellites. In 1977 the Department received the Award of the PAN's Scientific Secretary for solving the problem of determining gravity anomalies within a limited area on the basis of observations of the movement of artificial Earth satellites.

The rotational movement of the Earth is continually monitored by the Astronomical Latitudinal Observatory in Borowiec. Since 1957 it has been regularly observing changes in geographical latitude and UTO time as part of international cooperation with the IPMS (International Polar Motion Service) and the BIH (Bureau International de l'Heure) based on a Borowiec time scale linked correct to a microsecond (by the television method) to the UTC scale. At the same time, it performs analyses and interpretations of polar motion and latitudinal changes as well as of UTO time on the basis of IPMS and BIH data.

Tidal movements of the earth's crust are investigated by means of regular gravimetric observations in Warsaw and at the tidal station in Ksiaz near Wroclaw, as part of international cooperation. The Laboratory's own system for processing tidal observations enjoys considerable recognition and is employed throughout the world -- it is used to perform ongoing analyses of the network of stations of the socialist countries participating in geophysical planetary research.

Department of Space Technology

The Department was established to utilize space technologies and explore circumterrestrial space. This concerns direct, practical applications and the designing of unique research equipment. Among other things, plasma effects in the terrestrial ionosphere were investigated and equipment automating measurement operations was constructed. In addition, plasma resonance effects were investigated for the needs of forecasting heliogeophysical activity, as were the conditions of propagation for the needs of communication. In the natural laboratory represented by outer space, work on plasma physics and plasma technology, relating to problems in physics and plasma that are difficult to investigate in on-ground laboratory conditions, also is being conducted. Rocket experiemnts with so-called plasma discharge (as part of the USSR space program) were carried out, as were studies of plasma interaction.

Important projects include the work to develop systems for remote sensing of Earth, the seas, and the oceans. This work has included the designing of spectrometric and scanning devices within various regions of the spectrum for the needs of remote sensors and the development of a model of physical interpretation of the related effects.

Department of Celestial Mechanics

This Department does research into artificial and natural small solids in the Solar System, and until recently it had also been developing techniques for numerical processing of data on space observations (at present this development is being handled by the autonomous computational technology laboratory). It was precisely this Department that had processed the data on the Polish Interkosmos-Copernicus 500 experiment. The findings enabled the authors of the experiment to discover theoretically predicted plasma resonances in the ionosphere. A system of programs for automating orbital calculations on the motions of comets, including Halley's Comet, and planetoids has been put into operation. This system serves to promote the work on a catalog of single-appearance orbits, being developed in Poland in cooperation with Slovak astronomers. A similar system is being introduced for investigating the movement of artificial Earth satellites as well as for setting up a preliminary databse on Polish space experiments.

Topics of Space Research

Warsaw ASTRONAUTYKA in Polish No 1, 1987 pp 6-7

[Excerpts from interviews with Professor Stanislaw Grzedzielski by Pawel Elsztein (ASTRONAUTYKA), Ewa Gorzkowska (WOJSKOWY PRZEGLAD TECHNICZNY), Bozena Kastory (ZYCIE WARSZAWY), Barbara Majewska (RAZEM), and Waldemar Plawski (ZOLNIERZ POLSKI): "Prof Stanislaw Grzedzielski Comments on Astronautics, Space Research, and Other Important Matters"]

[Text] On 29 September 1976 a session of the PAN's Presidium resolved to establish, on the initiative of Prof Stefan Piotrowski (chairman of the Committee for Research Into and Peaceful Utilization of Outer Space, PAN), the Space Research Center. Formally we began to operate on 1 February 1977, but in reality our work commenced on 1 April 1977. We are working in a barracks which, to boot, has been under a demolition order for 10 years. We still remain the unloved tenants.

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Generally speaking, the primary purpose of the Center is to engage in research. But not only in that. This also is an institution serving to assure the application of space-research spinoff to the domains of the national economy that can benefit from it. We are primarily a coordinator. We work together with the Military Institute of Aviation Medicine, the Institute of Geodesy and Cartography, and academic centers nearly throughout the country.

We have not lost our enthusiasm. The fascination of outer space is something that lasts. Just as the conquest of the ocean was a turning point in the

history of mankind, so the conquest of outer space will, on the historical scale, also represent a fundamental change. A researcher perceives a multitude of tasks to be accomplished in space, if only such ones as verifying the general theory of relativity, manufacturing materials with unique properties, conducting research into fluid and gas dynamics, and many other topics.

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The space research pursued in this country during the 1970's is not another element of the propaganda of success and living beyond one's means like color television or the building of vacation cottages. This not some fun and games that can be dropped without regret. This research is a necessity, and the objective world situation compels us to conduct it. If we discontinue work in this direction our country shall very soon find itself in the situation of backward countries.

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Hermaszewski's spaceflight is a demonstration of our training capability and organizational possibilities, rather than a peak achievement of space research. Of course, while in space, Hermaszewski carried out a research program, but that was not the most important thing.

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How much does space research cost us? Very little. There would be no sense in giving the exact amount, because it is so small that surely no one would believe it. For it is generally overlooked that here in Poland we build neither spaceports nor rockets, since we are able to install our equipment for interesting experiments in, primarily, Soviet rockets and satellites. It should moreover be borne in mind that at present artificial satellites are equally needed by space researchers and people who have nothing in common in them. For in many domains -- of everyday life even -- satellite-transmitted signals have become a necessity. This requires equipment and techniques for their receiption as well as, in order to exploit their usefulness, the ability to read and interpret these signals properly on the basis of back-data.

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By space research I mean primarily the study of the physical aspects of matter in outer space, a science whose aim is to explore and describe natural pheonmena rather than their humanistic, social, or similar effects. At present we are best prepared for the exploration of outer space, such as it is.

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Our beginnings were not easy. Properly speaking, the Polish science community had not been prepared to participate in space research. I refer not so much to intellectual or technological preparedness as to a psychological barrier. It was commonly thought that our country could not afford research of this kind, wich only such powers as the Soviet Union and the United States could afford.

This belief in the superfluity of space research had been so strong for a long period of time that, especially in the initial period, there was no pressure from the Polish science community. Such problems engaged the attention of a handful of enthusiasts, who were fortunate if their work was not hindered. This accounts for the extremely tangible shortage of highly qualified scientists in this country so far as this field is concerned. Currently the situation is improving somewhat, and the growing number of potential designers of space equipment and the lively interest in and benign climate for space research in Poland constitute a brighter side of our activities.

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Our expenditures are solely on the design and construction of our own equipment. The account for about 1-2 percent of the total cost of experiments. For example, the experiments performed on board the Copernicus-500 satellite in 1973 cost our country about 10 million zlotys.

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The criteria for a country's achieving a leading rank in some field vary. And Poland very often is among the leaders in basic and applied research, done in cooperation with a strong partner. In this case, to the science community interested in space research our participation in studies of Halley's Comet is a proof that we have become part of a program of first magnitude on the international scale. We are gratified of belonging to the very small group of leaders in this field. In this connection, participation in such large international efforts serves to acquire experience of a totally different kind. It has to be teamwork participation. But then also this different style of action represents a new quality. We must learn to adapt to situations which in the future will increasingly often require cooperation rather than merely independent conceptual work. Such is one conclusion drawn from the Vega Mission which already is affecting us.

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I am an astrophysicist. I completed my studies in astronomy at Warsaw University and, as part of these studies, I took up astrophysics. I studied interstellar matter -- a gas which also is a plasma. I studied the structure and dynamics of the Galaxy. But it was a source of discomfort to me that many of my studies, and of the studies byt others, had been of a speculative nature, because the amount of observational data was small. In 1966 I decided to shift the focus of my interests onto space research, although I have not broken with astrophysics. Let me add that I was not the only one to act thus.

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Of the many projects performed at the Space Research Center special attention is deserved by certain studies dealing with space physics, which can be said to be the Polish specialty within the international Interkosmos program. This concerns studies performed with the aid of electromagnetic radiation analyzers over a broad frequency range, from fractions of a hertz to gigahertz. This entire range, or generally speaking the radio range, and its cosmic aspects,

has become a kind of Polish speciality, simply because of the need for research of this kind within the Interkosmos program. Many of the countries participating in this program turn precisely to us with requests to perform measurements within specified frequency intervals, because with respect to both the theory and practical construction of special apparatus we already have experience supported by practical results in this field. Publicity, if it can be put this way, was gained for Poland by an experiment conducted in 1973 by a team of Torun scientists -- the now famous Copernicus-500 program, and by the cooperating team from the Institute of Aviation.

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Geodynamics research can be termed a Polish specialty. We have succeeded in initiating measurement methods with a very broad scope that allow for both classical and modern techniques. Among the classical ones I count positional astronomic measurements, and among the modern ones, measurements performed with the aid of laser technology. It should also be emphasized that we were the first among the socialist countries to commence measurements by the Doppler method, which consists in the radio determination of the position of the ground station relative to the artificial Earth satellite, by utilizing measurements of changes in satellite signal frequencies.

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We also attach considerable importance to constructing remote sensing spectrometers for the needs of the national economy. We have developed the construction of equipment needed for ground measurements which, in combination with aircraft and satellite measurements, can produce satisfactory results. The countries participating in the Interkosmos program lack, at least as yet, an operating system collecting all data from four observational levels. Hence, the Polish wideband spectrometer may also become a useful device in the other countries participating in the Interkosmos program.

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All our space experience represents fragments of the larger experiments being performed for the most part by the Institute of Space Research in Moscow. Hence the frequent mutual visits, contacts, and continuous exchange of experience, equipment, and other materials. We are a partner of the USSR not only in the Interkosmos program. As known, in addition to that program, the USSR carries on an extensive national program for space research. We are often invited to participate in that program. This type of cooperation may be exemplified by our participation in the ambitious Soviet Iskra, Sava, and Vega programs -- ambitious, because they are among the leading achievements of science and technology.

1386
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POLAND: ACTIVITIES OF FIBER OPTICS CENTER IN LUBLIN

Lublin SZTANDAR LUDU in Polish 10 Feb 87 p 3

[Article by Mariusz Hortynski: "Lublin's Fiber Optics"]

[Text] The Fiber Optics Technology Center (OTO) in Lublin is a place that desires no publicity. Its director himself, Engineer Stanislaw Zbyrad, is opposed to any publication about it. He said, "We desire no publicity. All we want is a proper climate for our work. Being left in peace is what we need most."

It is hard not to agree with this dictum, but still many readers would certainly like to know what developments are under way at that center.

Preparations for a Leap

Last year the OTO produced about 1,000 km of optic fibers. They were multimodal, i.e., first-generation fibers with a "capacity" of 120 channels, serving to transmit data over a distance of up to 10 km. These thin glass threads were used by the OTO to manufacture about 70 km of 4-, 6-, and 8-fiber cable with capacities of 240, 360, and 480 channels respectively. Depending on their orders, the customers received two kinds of cable -- ordinary, laid inside a pipe, or protected with a metal armor and a plastic coating. The latter can be directly laid in earth.

This year output is to be doubled, and next year 200 km of cable are to be produced. That is the maximum that can be produced in present conditions, i.e., with the currently used machinery and equipment and in the existing premises. It can be said that a period of more than 3 years of tests and trials of prototype equipment is now over at the center. During that period the entire manufacturing technology was verified and refined. A great deal of valuable experience already yielding benefits has also been gathered. On this basis a new generation of more accurate and productive machinery is being developed.

For some time now the future, and not just the near future, has been considered seriously at the OTO. In the main hall, in an area especially set aside for this purpose, a completely new machine for producing so-called premolds has been installed. It is likely that another such machine will be

installed in April. The builder of both machines, based on the OTO's blueprints, is the Instrumentation and Special Equipment Center of the Lublin Truck Factory. Two more machines of this kind are being built at the Swidnica Transportation Equipment Factory. By year end a so-called tower, that is, a facilility for drawing fiber-optic threads through the pre-molds, will also be installed. Unimodal fiber-optic threads of the second generation, that is, with a capacity of from 480 to 1,920 channels, serving to transmit data over a distance of up to 20 km, will be manufactured on a fully automated production line. It also is worth noting that a project for the construction of a new two-storey production building measuring about 5,000 cubic meters in usable space has been drawn up. That building will adjoin the main plant building, and its construction is to begin this year.

During the second stage, after 1988, a large plant with buildings totaling at least 35,000 cubic meters of space is to arise. The complex of buildings will also include administrative and service premises, research and measurement laboratories, a chemical laboratory, a maintenance shop, etc. Once the first stage of construction is completed, fiber production will increase by a factor of 10, and cable production fivefold, while following the construction of the second stage the production will once again increase fivefold. This means that, compared with present-day output of optic fibers, their output will have increased by a factor of 25. It also is important that then it will be possible to produce optic fibers serving to transmit simultaneously several thousand conversations (data) over a distance of up to 30 km without the need to magnify signals. This totally new technology has already been developed at the Fiber Optics Technology Laboratory of the Maria Curie Sklodowska University.

A Bright Future

Now a few words about the applications. As known, customers for fiber-optic threads and cable include several ministries -- those of national defense, communications, mining, power, and transportation. Some more information on the applications of fiber optics has been provided to the EXPRESS WIECZORNY reporter by Commodore Professor Mieczyslaw Szustakowski, dean of the Department of Chemistry and Engineering Physics at the Military Engineering Academy in Warsaw. It thus is worth quoting his comments: "...A fiber-optic cable is one in which the beam of light running along the core gets reflected from its walls, that is, does not emanate outside. Thus, it is not possible to intercept the beam and, e.g., eavesdrop on the conversations transmitted by the cable. They cannot be jammed either. In conventional techniques of transmitting information by wire or wireless, eavesdropping or jamming is not a problem. Other advantages of the fiber-optic cable are its huge information capacity, small dimensions and weight, and the impossibility of mutual eavesdropping.... In the army its particular application is for transmitting information between army commanders as well as between the commanding officer and subordinates in field conditions. So far, metal cable has been used for this purpose, but now it is being supplanted by the lightweight and jamming-proof fiber-optic cable. In aircraft and ships with their multitude of electronic equipment, fiber-optic cable is an excellent means of internal communication, because it is not affected by on-board noise. It is also used in making precision gyroscopes. In addition, fiber-optic sensors reacting to

acoustical and electromagnetic fields are being designed. Armor-piercing guided 'projectiles, previously guided toward the target with the aid of a metal conductor, are now guided with the aid of fiber optics. The projectile, equipped with a miniature camera, transmits a picture to the monitor screen by means of fiber optics. As a result, the operator inside a shelter can observe the object on the screen and guide the projectile accurately toward the target. This works almost one hundred percent.... Another application of fiber optics is, e.g., in undersea cable which in the future is going to crisscross the entire globe. In mines, fiber optics can be used for underground communications. In automation, to guide robots. In medicine, to peek at the internal organs of our body. Cable television is based on fiber optics. Electronic optics as a whole is a mighty force. At present the arms industry also avails itself of it."

It also is worth noting that 2-kilometer telephone lines linking switching offices are being successfully operated in Lublin, Lodz, and Poznan. A line linking sensors of microearthquakes and movements of the earth has been installed in a black-coal mine. In railroading, fiber optics already is used to transmit various signals. Similarly, in banking it is used to transmit data. Last year the Institute of Chemistry at the Copernicus University in Tourn has developed an experimental computer network linked by fiber-optic cable produced at the Lublin OTO.

Thus two matters deserve emphasis. First, despite its as yet modest production capacity, the Lublin OTO is fully meeting all the needs of domestic customers. Second, fiber-optic threads and cable indeed have an assured bright future.

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ELENA CEAUSCESCU CREDITED WITH SCIENTIFIC CONTRIBUTIONS

Bucharest REVISTA ECONOMICA in Romanian No 1, 7 Jan 87 pp 5, 6

[Article by Victoria Fieroiu, chairperson of the scientific council of the Institute of Chemical Research, "A Remarkable Contribution to the Progress of Romanian Science and Technology"]

[Text] The development of science and technology and in particular the application to production and to socio-economic life of the latest advances in the technological and scientific revolution now in progress constitutes a primary factor in the growth of the forces of production. This development provides sustained growth and continuing modernization, and is fundamental to the multilateral progress of the national economy and the material and cultural well-being of the workers. This great advance of science in our society is the result of the policy of the Romanian Communist Party and the socialist state--a policy which in all of its components incorporates the clear-sightedness and originality of the party secretary general, Comrade Nicolae Ceausescu. This policy ensured the continued development of the material base as well as research, training of a cadre of specialists, and the growth of the role of science and modern technology in all areas of socio-economic life.

A key role in obtaining the results that have put the Romanian chemical and petrochemical industries at the forefront of the national economy belong to scientific research and technological engineering in this area--both of which have been carried out and continuously developed under the highly competent leadership of Comrade Academician Doctor Engineer Elena Ceausescu. A scientific figure of worldwide stature, Comrade Acad Dr Eng Elena Ceausescu, chairperson of the National Council of Science and Education, has dedicated the whole of her activity--marked by great enthusiasm and patriotism--to progress and peace, to the development of Romanian science and to the introduction and sustained assimilation of the latest advances of science into all domains of social and economic life.

This unified coordination of scientific and technological research in the chemical and petrochemical arenas was accomplished according to the plan and with the direct input of Comrade Acad Dr Eng Elena Ceausescu. It was through her efforts that the Central Institute of Chemistry was founded in 1970 and that design enterprises were added to it in 1973. This organizational structure proved its worth and was extended to all branches of the national economy. It later incorporated the research activities carried out by the teaching cadre in the schools of higher learning through their integration

with the speciality organizations in the Central Institute of Chemistry.

Currently the Central Institute of Chemistry is comprised of 31 organizations, 20 for research, 7 for research, plant engineering and design, 1 for plant engineering and design and 3 for research and production. The organizational system introduced through the activities and direct involvement of Comrade Acad Dr Eng Elena Ceausescu thus has brought together all of the specialities in chemicals and petrochemicals. This ensured that at the major industrial enterprises there were research elements--sections, laboratories, collectives as the case warranted--so that 70 percent of those engaged in research carry out activities directly linked to production

The three research and production organizations produce a wide variety of small and medium volume goods such as chemical reagents, ultrapure substances, semiconductors and various chemical products. At the same time, and also under the leadership and direction of Comrade Acad Dr Eng Elena Ceausescu, small volume production continued using a wide range of imported goods while developing conditions for research with Romanian produced resources.

The beginning of the chemical industry's development required a period of importing technology and whole assemblies, given our lack of experience. Particularly after the 9th RCP Congress, scientific research and technological development were called upon to perform extraordinary tasks. The excellent response that was given is demonstrated in the rising percentage of installations in the development programs that were built with our own resources. Thus in the years 1970-75, 30 percent of the industrial installations constructed in Romania were built from our own design. For the period 1976-80, thanks to the participation of researchers and specialists in industry, this figure rose to 80-82 percent. The 5-year period 1981-85 ended with 95 percent of industrial installations coming from Romanian designs and in this 5-year plan, the figure should approach 100 percent.

We can add to this--as the result of our perfecting and promoting the concept of research-design-production--our construction of a number of industrial facilities abroad. These include the Banias refinery in Syria, the Zarqa plant in Jordan, the Anatolia complex in Turkey, the TSP sulfuric acid complex in Homs, Syria, the acryllic fiber factory in the People's Democratic Republic of Korea to name a few. And we stand ready with a significant portfolio to participate in international contract competitions.

As a result of the country's technical and scientific activities, a number of original technologies were brought on line in industry. These technologies have been submitted for domestic and international patents. For example, the number of patents registered in 1985 was 2.5 times that registered in 1981 while the number of patents applied for jumped 7.5 times. The number of inventions for which patents have been applied for in the two ministries grew 35 percent from 1981 to 1985, and over half of these were developed at the Central Institute of Chemistry.

Below are several representative areas where there has been the gradual development of original technologies. These are technologies that can now be exported, thus further increasing their value:

--obtaining synthetic elastomers. The development of the production of a variety of elastomers in our country is based on the contribution and direct

activities--as a scientist of international acclaim--of Comrade Acad Dr Eng Elena Ceausescu, who, through her own research activities as well as her direction of the workforce has developed competitive technology of great value. This in turn has made possible the development of one of the most important series of products necessary for our national economy. Some of these technologies include those for polyisoprene elastomers, ethyl and propyl terpolymers, polybutadiene, butadiene-acrylonitrites, thermoplastics, transpolypentamers etc.;

--producing polymers with varied properties such as polymethacrylate polymers, epoxy resins including the halogenated resins and alkyd resins;

--processes for manufacturing plastics and elastomers to obtain numerous industrial reference systems as well as a wide variety of consumer goods, particularly in the areas of vinyl polychlorides, polystyrenes and polycarbonates, polyethylenes and polypropylenes;

--technologies for synthesis of monomers and large volume intermediaries in modern technology variants that are competitive, economical and of a high quality. Examples of these are the process for ethylbenzene synthesis, the process and catalyzer for producing styrenes, obtaining adipinic acid from cyclohexane and the process for the synthesis of aliphatic and aromatic amines;

--processes for the synthesis of monomers and polymers used in producing chemical fibers and the establishment of domestic synthetic and artificial fibers industry;

--technologies for medicines for human and veterinary use that are produced through synthesis, biosynthesis or processing of medicinal plants and their waste products including those for intermediaries;

--the creation of a domestic industry for dyes and organic pigments which meets most of our needs and supplies products for export; these include a wide variety of intermediaries;

--producing various types of detergents--aryl, alkyl, sulfonic and non-ionic polyoxethylates, producing auxiliaries for the textile and furs and leathers industries based on acrylic acid and its esters and producing auxiliaries for manufacturing elastomers and plastic materials (reticulation agents, anti-degradents and agents for protection against ultraviolet light);

--procedures for the manufacture of ultrapure semiconductor products with particular characteristics for electronics and microelectronics;

--technologies for a wide range of high-purity reactive chemicals (of the MOS and EG types) as well as for the photographic industry;

--synthesis of unconventional insecticides (ferromones) as well as organophosphoric, sulfocarbon pesticides, herbicides and fungicides including specific intermediaries;

--procedures for hydrogen refining of petroleum and for improving the use of raw materials and replacing classical refining processes which result in better products through the elimination of acidic tars;

--the process of hydrogen treatment of petroleum to obtain superior motor oils;

--producing a wide range of catalysts for the chemical and petrochemical industries including processes to recover useful elements and used catalysts;

--technologies to obtain fertilizers through nitric attack from phosphorous rocks, selenium and manganese salts, special alloys and metallic powders and inorganic pigments.

Based on priorities established through the coordination of the National Council for Science and Technology, there has been work in recent years to produce the chemical and petrochemical products necessary for all branches of the national economy and particularly to develop modern areas of high technology. This work has centered on the better use of indigenous resources, of lower-grade minerals and on recapturing and recycling reuseable materials thereby substantially reducing the consumption of raw materials and energy.

In 1986, in line with the tasks laid down in the 1986-1990 plan and thanks to the leadership and effective assistance of Comrade Acad Dr Eng Elena Ceausescu, there has been important progress in a number of areas. There is much greater in-country production of products previously imported that are necessary for modern technologies especially those of electronics, microelectronics, aeronautics and nuclear energy. There have been advances in producing fine chemicals--medicines, auxiliaries, dyes, biostimulators and damage inhibitors--and in introducing new, unconventional technologies. 1986 has seen the introduction of an important number of products from the programs targeting product assimilation. These include synthetic tannings, ester derivatives for cosmetics, paints based on different polymers, additives for motor oils, photosensitive and photoreactive products, auxiliaries for producing plastics and rubbers, special-use tires, metals and special alloys, and other new products.

The program of modernizing chemical and petrochemical installations has been the subject of particular attention of the research and design activities carried out in conjunction with production units. The large-scale modernization activity which is implemented and embodied in programs with special objectives, is aimed at increasing production, decreasing material and energy consumption thereby reducing production costs, improving quality, diversifying products and increasing exports. These goals are, of course, in conformity with the tasks and guidance of the party secretary general, Comrade Nicolae Ceausescu. To obtain the desired results, specialists in the Central Institute of Chemistry working closely with specialists in production are striving to introduce new technologies which correspond to the objectives proposed. Thus they pursue the introduction of simplified technologies with fewer steps, linking together certain production processes, the introduction of more active catalysts, the exploitation of more available raw materials, advanced recovery processes for reusable products in the production circuit, employment of superior equipments etc. Elements of the Central Institute of Chemistry have obtained important results in these areas. These will appear as efficient technological modifications in industry which can lead to achieving the targets for 1990.

The scientific activities of Comrade Acad Dr Eng Elena Ceausescu have appeared in an important number of works published both at home and abroad. The works, "The Stereospecific Polymerization of Isoprenes," translated into 9 languages, "New Research in Monomolecular Compounds," translated into 7 languages and "Research in the Chemistry and Technology of Polymers," translated into 5 languages have gained the unanimous acclaim of world famous scientists. These works have earned more than 38 titles and honors from numerous academies and universities throughout the world, and they have contributed to the international prestige of Romania. Under the guidance of Comrade Acad Dr Eng Elena Ceausescu, production of "The Encyclopedia of Chemistry" is underway; three volumes of this work having already appeared. In 1986 as well, international scientific opinion noted a number of editorial events involving the distinguished works of Comrade Acad Dr Eng Elena Ceausescu. In November at Bratislava, festivities marked the publication of a translation of "New Research in Macromolecular Compounds," while at the Slovac Academy of Science in Tot, a Korean language translation of "The Stereospecific Polymerization of Isoprene" was published in 1986. All of these works received wide praise and were prefaced and presented by famous personalities in international science all of whom spoke of the distinguished scientific contributions and the high level of the work of Comrade Acad Dr Eng Elena Ceausescu.

With the most pronounced sentiments of respect, esteem and joy, those who work in chemicals and petrochemicals address to Comrade Acad Dr Eng Elena Ceausescu the warmest wishes of health and of new and greater successes in the untiring work to implement the party policy and to raise Socialist Romania to new levels of progress. At the same time, they extend expressions of most respectful appreciation for the unceasing assistance which they receive and which allows them to toil with all their energies, with passion and self-sacrifice, to achieve the programs aimed at progress and peace.

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EXHIBITS AT BRNO FAIR DESCRIBED

Prague VYBER INFORMACI Z ORGANIZACNI A VYPOCETNI TECHNIKY in Czech No 6, 1986 pp 829-841

[Text] The International Engineering Fair Brno 1986 took place this year at the traditional time of September. It brought us a number of interesting and up to date products of domestic and foreign exhibitors. A number of new, advanced products and equipment were also exhibited in the field of computer and reprographic equipment.

Traditional and new products as well were exhibited by the Czechoslovak electronics and computer industry in the Czechoslovak exposition set up under the aegis of PZO (Foreign Trade Enterprise) Kovo. The visitors were most interested in the 32-bit SM 52/12 minicomputer which was awarded the fair's gold medal for its merits. The computer is part of the SMEP (system of minicomputers) system. The setup exhibited contained a 100 Mbyte disk memory and the Czechoslovak manufactured SM 5311 magnetic tape memory and the Czechoslovak manufactured SM 533 11 magnetic tape memory as well. The computer is equipped with an operating system working with virtual memory. A new item which was exhibited was the 16-22 mini-computer system, which is a 16-bit minicomputer of design similar to the SM4. The internal computer memory can have a maximum capacity of up to 4 Mbytes and the basic installed memory capacity is 512 Kbytes.

The most extensive exhibit of the Czechoslovak manufacturers in the field of computer equipment was the EC 1027 computer system. This is a general purpose, 3.5 generation, modular structure computer which is part of the JSEP (Unified System of Electronic Computers) system.

The development and production of computers is handled in the ZAVT [Automation and Data Processing Technology Plants) concern. This concern also exhibited its proven ADT 4700 minicomputer which is widely employed by Czechoslovak users. Just as at many other expositions, heree too the Czechoslovak exhibitors showed various types of personal computers. These include in particular:

-- the PP 06 professional personal computer developed within the SMEP program at VUVT (Computer Technology Research Institute) Zilina. This is a computer in the class of the IBM PC/XT with up to 640 Kbytes of RAM memory, equipped with external memory on floppy disk (this memory is

integrated into the computer) or winchester-type memory with a capacity of about 15 Mbytes;

-- another personal computer designated PP 01-16 from the SMEP program was also exhibited. This is a 16-bit personal computer made up of one design entity including the keyboard. A cassette tape or a unit with two floppy disks is connected as external memory and there is a color television monitor;

-- another personal computer displayed was the 10 151 which is supplied especially for instructional applications in education;

-- the Tesla PC-88 is a personal computer developed by Tesla Piestany. It is based on the 8088 16-bit microprocessor (4 MHz) and is compatible with the IBM PS/XT. It is equipped with a minidisk controller for up to 4 devices. It was shown with a color monitor.

In connection with personal computers, a very interesting piece of equipment is the HV01 voice output produced by Tesla Trinec. Text streams with lengths up to a maximum of 96 characters are transfered to the voice output with a high level of understandability. It was displayed in conjunction with the PMD-85 personal computer.

The Text 01.M equipment which serves especially for word processing, but also as a computer resource for processing less extensive jobs, is closely tied into the category of personal computers.

Of the peripheral equipment, the EC 7140 and EC 7246 electrostatic printers were especially noteworthy. Last year the 7140 printer was awarded the fair's gold medal. This is an electrostatic line printer which can print alphanumeric and graphic information at the speed of 1,200 lines per minute. The printer is controlled by the MPS 8020 microprocessor unit (from the Mikrosat builder). Printing is done on special paper.

Other exhibits were keyboards and the C 321.3 electronic printer from Zbrojovka Brno. The same manufacturer also exhibited the C 2715 programmable equipment for data preparation on floppy disk. This is an updating and expansion of the C 2711 to 2714 models, with which the 2715 is fully compatible from the applications, data, and program standpoints. The 2715 is designed as desktop equipment (for placing on a table).

The Soviet Union's exposition contained minicomputers and microcomputers in particular. The core of the exposition was the SM 1600 minicomputer system. This is a two-processor system in which one processor is specialized for processing textual and numerical data of variable length. The use of this processor speeds up the processing of economic information. The computer performance is further increased by the use of a two-gate input into the main computer memory, which makes concurrent working of both processors possible in principle. The computer system compiler is the standard SMEP compiler, the common compiler. All standard operating

systems for the SMEP (OS RV, DOS KP, DIAMS, and others (as published)) can be used as systems software for the computer, as well as the supported program languages in them. Under the OS RV operating system, it is possible to make use of a library of special processor programs which contain routines, such as, for example, classification generator, input programs generator and input information auditing, and PL/1 language compiler which executes subquantities of the PL/1 language for JSEP. The routines utilize a set of instructions of the specialized processor. They increase the performance of the system working under the OS RV control, particularly in the multiuser and multiprogramer working mode. The SM 1600 computer can also work in network with the other SMEP computers. For this purpose STO/RV and SIT SMEP (SMEP network) programs working under the OS RV control are utilized. The MMK/P (as published) program package serves to create systems composed of SMEP and JSEP computers.

The basic characteristics of the SM 1600 computer are:

--main memory capacity of 256 Kbytes,

--memory cycle, 720 ns,

--number of channels with parallel boundaries IRPR, 11,

--number of channels with serial boundaries IRPS, 14.

It is possible to connect to this computer up to four programmable economic terminals containing a processor, up to 112 Kbytes of memory, a display (1120)characters) with keyboard, a printer, and memory on floppy disk. The APM-nastil system was also exhibited, which is a set of equipment and software for optimizing cutting materials. The equipment part of the system is the Elektronika 60 minicomputer with the following basic parameters:

--16-bit microprocessor;

--time needed to execute an instruction, 4 to 7.6 us;

--capacity of the main memory, 64 Kbytes;

--alphanumeric display with keyboard.

The Stafeta computer network, which is a local network comprised of various types of computers typically located in the areas of enterprises and plants, was a very interesting exhibit.

The local network is composed of Stafeta network stations, the cable for connecting these stations in a circular topology, the station software which is placed in the stations' permanent memory, and the software of the computers connected to the network.

The network allows for connecting up to 125 network stations. Two-wire telephone lines can be used as the transmission medium. With this wire the maximum distance of the neighboring stations is 1.5 km. This distance can be increased by using an improved conductor. Each station has a C2 port to which can be connected an intelligent or nonintelligent terminal, a printer, or other peripheral equipment working with the C2 port. Information is transmitted around the circular path at a speed of 125,000 bits per second. Appropriate software provides for the creation of virtual channels for information transmission between the member stations. Up to 63 virtual channels can be created for connecting a given station with the other stations of the system. The station is basically made up of a microcomputer system containing an 8-bit microprocessor, 4 or 8 Kbyte capacity permanent memory, 2 or 4 Kbyte capacity RAM memory, a C2 or IRPS port controller, and circuits for connecting into the circle and for synchronization.

Another exhibit displayed was the SM 1420 system in an application for directing first aid. The Iskra 555-14 electronic instructional machine was also shown.

An orientation toward minicomputers and microcomputers was also noticable in the extensive exposition of the Bulgarian People's Republic. Of the SMEP system equipment, there were two exhibits that were particularly interesting:

--The SM 1603 M3 video terminal, and

--The CM 5404 disk memory with 100 Mbyte capacity.

The core of the exhibit was the personal computers. There was particular interest in the Pravec-16 computer which is compatible with the IBM PC personal computer. The Pravec-16 is based on the 8088 microprocessor and contains RAM memory of 256 Kbyte capacity, expandable up to 640 Kbyte capacity. Two floppy disk units with enter on two sides and doubled record density are used as external memory.

Extensive software, such as sets of programs for medical applications, data bank information systems, and others, are likewise being offered for the minicomputers and particularly the microcomputers displayed.

The German Democratic Republic's exposition was traditionally extensive. It displayed numerous peripheral equipment, computer systems, and problem oriented computer systems equipped with the appropriate software as well. Of the many printers displayed, let us mention at least the 6314 dot matrix printer. The electronic Robotron 6130 typewriter exhibited is used for automation of office work and represents an already traditional field of equipment for the Robotron company.

Two exhibits represented the professional personal computer:

--the Robotron 1715 computer with the 6120 S printer. This computer based on an 8-bit microprocessor is already being delivered to the CSSR;

--the A 7100 computer based on the 8086 16-bit microprocessor. The maximum capacity of its RAM memory is 768 Kbytes. The computer is equipped with a keyboard and a display. Two integrated floppy disk units and a maximum of two external units can be used as external memory. The capacity of a unit is 500 Kbytes. A maximum of 306 Kbytes can be utilized on the system floppy disk. The computer works with the CP/M-86 operating system which allows for use of, among others, the Basic (floppy disk version), Fortran, PL/M, Cobol, Modula, and Pascal programming languages.

Of the systems exhibited, the one that got the most attention was the A 6471 system for image processing. The system is utilized particularly for ground surveying, for automatic analysis af microscopic pictures for medicine and biology, and as a means of processing and evaluating images in industry in automating measuring and testing methods.

Exhibitors from the Polish People's Republic exhibited an extensive assortment of microcomputers and peripheral computer equipment. There was very numerous representation of microcomputer systems at the level of the professional personal computers. In this field, the following systems were displayed:

--the ComPan SM 1905. This is a microprocessor system based on the 8080 8-bit microprocessor. Expansion of the microprocessor address bus by 4 bits makes it possible to utilize an address space of up to 2 Mbytes. Memory is added on up to 512 Kbytes. In addition to this memory, a monitor memory display (RAM) with a capacity of 32 to 64 Kbytes is also used. Floppy disk memory is used as external memory;

--the Mera 660 system represents the professional microcomputer. The processor system has two versions. The first had 64 Kbytes of RAM memory and a maximum speed of 800,900 operations per second and the second has 256 Kbytes of memory and a speed of 500,000 operations per second. The system is oriented mainly at industrial applications. It is equipped with the RT-60 (analog to the RT-11), MRT 60 (analog to the TSX), and Demos (analog to Unix) operating systems. The 3270 and 3760 emulators are available. The hierarchical local network SN-60 which can be built using these computers is also very interesting;

--the Mazovie 1016 is a professional personal computer equivalent to the IBM PC XT. It uses a 16-bit K 180WM1 microprocessor (equivalent to the 8086), 256 Kbytes of RAM (maximum 640 Kbytes), and 48 Kbytes of ROM. The graphics monitor has a resolution capability of 750 X 320 pixels (equivalent to the Hercules) and memory on floppy disk;

--the Elwro 800 microcomputer system contains components built on both 8-bit and 16-bit microprocessors. The 8-bit is based on the 8080 microprocessor and the 16-bit on the 8086 microprocessor with the capability of using the 8087 coprocessor. The system bus is based on the IEC-AMS

standard. It makes it possible for the 8-and 16-bit microcomputers to work together with the other components of the system (at the board level). A very broad software support for the system contains equivalents for the majority of the modern operating systems (among others, Concurrent DOS).

Of the peripheral equipment, the Mera 7953 N (CM 7209) display unit was the main eyecatcher. The D 100/E dot matrix printer for microcomputers, which is compatible with the FX-80, also drew a lot of attention. It prints at a speed of 100 characters and printing is carried out in both directions with up to 137 characters per line. The printing head has nine pins. The printer has a number of modern features such as, for example, programmable horizontal and vertical formating.

The central exhibit at the Rumanian Socialist Republic's booth was the Felix L-102 F/4M minicomputer system. It differs from the computers supplied to the CSSR mainly in that it can be provided with MOS semiconducter with a capacity up to 4 Mbytes. Memory circuits of 64 Kbits are used. The memory cycle period is 400 ns. Like the F 102's supplied, a cache memory with 2 Kbyte capacity and a response time of 150 ns is used. The memory control unit makes it possible to work with memory pages up to 8 Kbytes. The computer can be expanded with an instruction processor in the moving sequence line which works with high speed (Loading into the moving sequence line and modification to double length in 5.4 ns) or with the capability of dynamic microprogramming. A floppy controller making it possible to connect 200 mm or 130 mm floppy disks is being offered as a new controller. With the 200 mm disks a format compatible with the IBM 3740 is used and with the double density disks (512 Kbytes per disk) the PDP format is used. Of the display terminals exhibited, one that particularly caught attention was the microprocessor-controlled, graphic-alphanumeric terminal VDT 528 [Translator's note: original unclear; this may be 52 S] providing an alphanumeric function for the DEC VT 52 terminal and a graphics function to the Tektronics 40XX terminal. In the graphics presentation a raster displays 512 X 256 pixels. The DAF 2020 graphics vector display is designed mainly for CAD/CAM applications. The terminal is compatible with the VT 100 and the Tektronics 4010. The resolution capability is 512 X 288 pixels. Vectors can be displayed in various treatments (solid line, dotted line, etc.) at a speed of 30 ns/pixel.

The personal computer was not missing at this booth either. The Junior model based on the Zilog Z80 microprocessor with up to 64 Kbyte RAM memory and 8 Kbytes of EPROM was displayed. It is possible to use the graphics monitor supplied or to connect a television receiver. The floppy disk controller supports up to four disk units of 130 mm or 200 mm (with two-sided records the corresponding capacities are 512 and 200 Kbytes). The disk drivers are located in a separate unit (not integrated into the computer.

The high speed of performing instructions (400,000 instructions from register to register per second), high memory capacity, and a bus transmission speed of 2.5 Mbytes per second make this a computer in the same category as the PDP 11/44.

The exhibitors from the Hungarian People's Republic displayed traditionally modern products. They too presented several types of personal computers:

--the M08X is shown as a professional personal computer based on an 8-bit microprocessor. The Maximum capacity of the RAM memory is 64 Kbytes. A maximum of four external floppy disks can be connected, as well as up to four Teleterm type terminals in addition to the usual equipment. The computer is equipped with the Propos operating system (equivalent to CP/M) with Basic, Pascal, Fortran, and C languages. It is also possible to use emulation programs for emulating JSEP, SMEP, IBM and Siemens terminals.

--the TAP-34M (EC 8534.02) is a professional personal computer likewise based on an 8-bit microprocessor. It works with two operating systems. Under the TAP-34 system, in which it is compatible with the TAP 34 intelligent terminal, programs from that terminal can be executed on this personal computer without changes. It can also work under the VDOS operating system compatible with CP/M. Up to four 200 mm floppy disk units can be connected. Of the other equipment which can be connected, the TMT-120 dot matrix printer produced under license from the Mannesmann Tally company is particularly interesting. The printer can be equipped with two types of printing heads, which are a head for printing in a 9 X 7 point matrix for normal printing and a head for printing in an 18 X 40 point matrix for letter quality. The normal printing takes place at a speed of 169 characters per second and letter quality printing at 40 characters per second. Up to 160 characters per line can be printed. The compact printer weighs 9 kilograms.

--The Proper-16 is a professional 16-bit personal computer based on the 8088 microprocessor. Its standard equipment is 256 Kbytes of RAM memory which can be expanded up to 704 Kbytes. As memory it uses floppy disks with a capacity of 360 Kbytes (up to four BASF 6128 units) and in later systems Winchester memory as well (10 to 30 Mbytes in a maximum of two BASF memory units). In addition to the usual peripheral equipment, it is also possible to connect black and white and color display monitors to the computer simultaneously.

The new type of VT 20 A computer designated the VT 20/IV M represented a complex microcomputer system. The new computer has two modes of operation, 8-bit or 16-bit, expanded memory, and higher performance. In the basic configuration it is equipped with 256 Kbyte memory (expandable to 512 Kbytes) and also Winchester memory with a capacity of 10 to 40 Kbytes (and 130 mm floppy disk memory with a capacity of 1 Kbyte per unit). In the 8-bit mode the computer works with the UPM operating system which is compatible with CP/M. In the 16-bit mode the UDOS operating system is compatible with MS DOS. Up to four VDM 52500 terminals can be connected to the system.

Extensive applications software is also offered for the system.

The exhibited VT 32 computer represents a high-performance microcomputer system in the desktop category. The microcomputer has 16/32-bit

organization, that is, the internal structure is 32-bit and the external bus (port) is 16-bit. The 16/32-bit microprocessor works with a frequency of 8 or 10 MHz.

The computer contains 32-bit data and address registers. The maximum extent of the address space is 16 Mbytes. The actual extent of the installed main memory is built up of 512 Kbyte modules. The computer has 56 commands and 14 addressing modes. Two series connections and a parallel connection serve for connecting up peripheral equipment. The computer exhibited was equipped with, among other things, a VT 21200 dot matrix printer and a VDN 52500 display. For external memory one can use 130 mm floppy disk with a capacity of 1 Mbyte per unit or Winchester disk with a capacity of 10 or 27 Mbytes. The computer can be used for administrative applications, for network applications, and in principle also for the CAD/CAM field.

In addition to these computer systems mentioned above, numerous peripheral equipment was also exhibited, such as several various types of display equipment including the ODT-82, the TAP-34,EDT, and displays in the VDT 52XXX series.

The Italian firm Olivetti, one of the traditional exhibitors, exhibited especially microprocessor-oriented equipment. In particular, the M 19, M 22, and M 28 personal computers were exhibited (see Vyber No 4/86). They also displayed the PE 24 microcomputer which is oriented to the applications field of design using computer CAD/CAM. The Formula 1 car (Brabham) which was likewise displayed at the booth also increased interest in the booth. The company has connections with the Formula 1 world in that, among other things, many of the races use the Olivetti computers for measuring time and computing results.

The most extensive variety of printers was shown by the Austrian company Mannesmann Tally. Its product range includes printers based on various principles of printing, from dot matrix printers through ink jet printers up to desktop laser printers. The printers serve to print normal text and many also print OCR (as published) letters and bar codes. They are utilized with a variety of computer systems, from microcomputers through minicomputers up to extensive computer center systems.

The MT 160 is a typical dot matrix printer printing at a speed of 180 characters per second (or 40 characters per second for letter quality) with 80 characters per line. It is equipped with a series or parallel port. The 180 model printer has a comparable performance with 132 characters per line. The line matrix printers MT 690 and MT 660 offered are of very high performance. They print at a speed of up to 900 lines per minute (about 400 lines per minute for letter quality printing). They can also be equipped for printing OCF letters. The set of 96 characters is loadable from the computer. The MT 910 laser printer serves for demanding pplications of mini- and microcomputers. It prints at a speed of 10 pages per minute and is equipped with 512 Kbytes of memory. It can emulate the majority of the well-known printers. The discrimination capability of the printer is 300 X 300 points.

The Rank Xerox company exhibited in particular a traditional assortment of copying machines, supplemented of course with new models as well. The highest performance equipment exhibited is the RX 1075 with an output of 55 pages per minute and a number of optional features. An expression of the tendency toward creating complex systems for administrative data processing is also to be found in the equipment of the Rank Xerox high-performance personal computers. The RX Turbo and RX Op lite personal computers, whose descriptions we brought you in No 4/1986, were exhibited.

The Am Inatrenational company is one of the leading manufacturers of offset printing machines and phototype machines. In its traditionally located booth it exhibited mainly a small format offset machine. The machine prints with a wide range of functions on paper weighing 30 to 250 grams per meter at speeds of 3,000 to 9,000 pages per hour. The TCS 6 printing line which takes care of all operations from the creation of the matrix up through the offset printing was also exhibited. The company's phototyping means are based on the AM 6818 or 6814 work stations. The stations are equipped with a keyboard and monitoring screen which make it possible to put the text whose printing we are requesting on floppy disk. The stations have various capacity screens (up to 2,400 characters). The station is provided with an extensive range of functions by means of the appropriate software which makes it possible to compose more complex texts, texts with the desired graphic and formating features, tables, etc. The floppy disk in the station serves then as the input medium into the illuminating unit for the Model 6800 phototyper. This unit works at illumination speeds of 100,000 to 600,000 characters per hour. In individual application it is possible to select the desired letter type for printing from a catalogue of more than 1,000 various kinds of type.

The Ross company exhibited the Commodore computers, as well as the associated set of peripheral equipment and software. The PC 10, PC 20, and PC/AT (8 MHz) computers were exhibited. The most interesting exhibit was the personal computer expansion board designated Tiny Turbo 286. The board serves to significantly increase the perfromance of a personal computer equipped with the 8088 microprocessor. It is supplied with two microprocessors, the 8088 (to maintain compatibility with the PC and PC/XT) and the 80286 which is used for increasing performance and working with the use of rapid cache memory in a 16-bit bus. The board increases the PC or PV/XT computer performance to the level of the PC/AT computer for a relatively low cost. It particularly speeds up graphics applications, network applications, utilization of Windows, programs for calculating tables, database applications, and some others. The QMS Kiss desktop laser printer was exhibited as an output device for personal computer applications which have a large volume of output. It prints at a speed of eight pages per minute with a resolution capability of 300 x 300 dots per inch. It can be equipped with up to 216 Kbytes of memory. The printer can emulate several widespread types of printers, such as the Esson FX 80.

The Hewlett Packard company traditionally participates in the fair with a number of interesting exhibits. This year it exhibited, among other

things, the Laser jet desktop laser printer. It has included the Vectra computer based on the 80286 microprocessor with a frequency of 8 MHz in the ranks of the personal computers. Another interesting personal computer is the 95 561 A based on 16/32-bit architecture, exhibited with 1 Mbyte of memory.

Microprocessor technology is also finding a path into the traditional fields of office equipment such as addressing and labeling machines.

The Steilow equipment exhibited in the Postalia booth makes it possible to print addresses and labels from a set prepared on minidiskette (90 mm). About 1,000 addresses can be stored on one diskette.

Without doubt the most interesting exhibit at the Agfa company's booth was the digital scanner exhibited in conjunction with the IBM PC personal computer. The equipment transforms an image in A4 format into digital form in order for it to be further processed by computer. The equipment is provided with 2,000 light sensors, each of which can register up to 64 shades of gray. The equipment has cache memory for storage of the digitized image with a capacity of 1 Mbit (128 Kbytes) or up to 5 Mbit (512 Kbytes). The equipment can be provided with various resolution capabilities for 150 to 240 dots per inch. Digitization of one page at the lower resolution takes 3 seconds. It is possible to control a number of factors during digitization. It is subsequently possible to make various extracts, etc. from the image. The most interesting of the copying machines displayed was the Agfa X 55-5 with a speed of 55 copies per second, collation, capability of printing on both sides in various options, etc.

A new participant in the fair was the Yugoslav company Iskra Delta, exhibiting an assortment of mini- and microcomputers.

The Austrian company Hero exhibited a broad product mix of peripheral equipment and control units. One of the pieces of equipment which drew attention was the continuous record (especially Kenedy (as published)) magnetic tape unit. A very high record density (up to 6,250 bits per inch with GCR (as published)) makes it possible for the unit to achieve a high capacity of up to 270 Mbytes. The Memorex 3650 system of disk memory compatible with the IBM 3350 was among the equipment offered. Up to 32 drives can be connected to the system's control unit which gives a total maximum capacity for the disk system of 10,160 Mbytes. The average retrieval time for the memory is 25 ms. Each disk memory is also provided with fixed heads which serve to accelerate some operations with the money.

IBM exhibited only a narrow slice of its production. In particular the IBM PC personal computer was exhibited in the XT and AT versions. The 3270 PC/GX graphics computer drew the greatest attention. It is possible to utilize it as an intelligent terminal working with large IBM computers and it is also possible to use it in an autonomous working mode. That is how it was shown at the fair. It is equipped with a color display

(16 colors) with a resolution capability of 1024 X 1024 pixels and other graphics equipment, that is, a color coordinate recorder, a printer, and a digitizer for inputting graphic information.

The NCR company likewise exhibited personal computers. There was user interest particularly in the 9050 terminal systems which are supplied in several versions. They represent compact 32-bit minicomputer systems.

The Scan Trade company offerred a broad assortment of equipment from personal computers, the Tiger multiprocessor system, up to the Tandberg IS 10 language laboratory which significantly increases the productivity of foreign language instruction.

The Wang company exhibited in particular components of microcomputer and minicomputer systems, especially systems working with virtual memory.

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BRAZILIAN SOFTWARE FIRMS CONCERNED ABOUT FOREIGN COMPETITION

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[Article by Jussara Maturo: "The Software Law: a Bothersome Flea Behind the Ear"]

[Text] Confident in the industry's growth next year, Brazilian software producers and distributors are nevertheless apprehensive about the impact of the software law.

Software

A trend toward strong market growth, especially marked in the second half of this year, is predicted to hold steady in 1987. This seems to be the prevailing forecast for the software industry. But if the economic measures decreed by the Sarney government at the close of 1986 did not rock the industry drastically, as indicated by end-of-the-year balance sheets, the same cannot be said of political decisions. Even the most optimistic forecasts betray a certain apprehensiveness about the possible impact of the new software law on the market.

"Everything depends on how the nation regulates the marketing of foreign software," said Oscar Landes, manager of Tecnosoft. Some Brazilian producers fear that the bill incorporates liberal ideas which they say could restrain Brazilian products from helping to meet the growing demand for software. Landes predicts that "If the doors are opened to foreign software without restriction, many Brazilian software firms will fold, especially those that invested in basic systems and support systems."

Whether or not the bill will in fact become law in 1987 remains to be seen. After all, it is the year of the Constitutional Assembly and it could be difficult to push through a bill on a subject as complex as software. "But if it were, the effect would be beneficial for determining the value of software, regulating the market, and protecting users and Brazilian capital itself, which would feel safer about investing in software," according to Francisco do Rego Ramalho, vice president of Assespro Nacional.

Controversy

Discussions on the directions to be taken by the software bill always center on the same issue: national similarity, which is considered a crucial

problem by Brazilian producers as well as distributors of foreign products. It is as crucial as it is controversial.

On one hand, distributors are gearing up to remove this provision from the bill, claiming that allowing similar national software would mean legalizing piracy, since foreign companies' access to the Brazilian market would be restricted. "If the provisions of the bill are approved as submitted at year's end, many distributors will be forced out of the market," notes Rafael Barajas, manager of Compucenter, one of the largest software distributors in Brazil, and president of the newly founded Brazilian Association of Software Firms (ABES), most of whose members are representatives of foreign products and subsidiaries.

Dataservice Indefinitely Postpones Five Development Projects

On the other hand, Brazilian producers believe that similar national products would be more attractive if coupled with a surtax on imported products. "Right now, Brazilian software companies are competing with products whose development, personnel and marketing costs have already been recouped before they even come into the country," commented Jose Fernando Parra, manager of Dataservice.

As far as Ramalho is concerned, the bill in its present form does not properly address the issue, since approval to sell foreign products is conditional upon the existence of similar national products, but the import procedure is rather liberal. "Under this bill, SEI would issue import permits renewable every three years, with no limits on quantities imported, which would constitute a procedure different from that applied now to other products in Brazil," he said.

Delayed Projects

However, caution is being publicly expressed only in national producers' investment plans. Dataservice, for example, concerned about software legislation, chose to postpone indefinitely five development projects for IBM mainframe support software, which would have cost at least 5 million cruzados. "Since all these projects have their counterparts abroad, we need to guarantee a return on our investment," Parra explains.

According to Paulo Magalhaes, technical manager of Computer Associates, the software project was not considered a threat to the company's plans, which expects a 30 percent growth rate in the mainframe software market next year. "I am not thinking in terms of drastic steps immediately," he says. McCormack & Dodge's expectations for application software for large systems are also optimistic. "In principle, no law has a retroactive effect on the market, especially a market with strong growth," says Alcides Costabile Collazzi, manager of M&D's affiliate in Sao Paulo.

At any rate, Collazzi thinks sales should slow over the next three months. "In addition to the fact that it is traditionally a time of slow business, executives should wait for the economy to adjust to the new measures put

into effect under the Second Cruzado Plan and then expect political decisions on software," he said.

Software Desenvolvimento de Sistemas de Informacao doesn't think a slowdown on the market would cause any drastic changes, either. "The February Cruzado Plan was more thoroughgoing, but after the shock, business picked back up again," recalled Pedro Verdugo, the manager of the company. Nor is software regulation the top concern in the company's plans. The firm specializes in utility applications for large systems. "This field has an essentially natural reserve due to the very nature of Brazilian labor and accounting legislation," said the manager.

Takeoff

If the predictions are right, 1987 should be the year for software, particularly for microcomputers. "The market is indicating more organized growth in which users seem to be more mature as they finally emerge from the flood of information of the last few years," reflected Mario Kaphan, manager of Humana Informatica, a firm specializing in data transmission software. He expects to sell 5,000 copies of Z in 1987, five times 1986 sales. "I don't think the software law will affect our performance."

Rafael Barajas credits growth in this market to increased demand for microcomputers, which has been particularly strong in the latter half of the year. "The trend is to introduce products using artificial intelligence, especially in data banks, and the implementation of line graphics, which is poorly researched and which should grow," he added.

As far as Ramalho is concerned, with the takeoff that supermicrocomputers have shown on the market, Unix's optimism should be reinforced in Brazil next year. "We will witness the emergence of a very interesting market with quite high growth rates," he predicted. According to Ramalho, the business community should consider this emerging area very carefully and take advantage of the opportunity to invest in the development of software designed for it. "The latter part of the year indicates that the market for software is more mature, and the generalized piracy phase is over."

[Boxed material p 26]

Special Projects

After the First Cruzado Plan was decreed, the software industry experienced slackened sales, primarily because of reduced investments from the financial sector. However, since June demand has increased, fueled by industry in search of higher productivity and the resumption of financing campaigns. The likelihood of an expanded market guided 1987 plans of a good number of software companies.

Tecnosoft had already invested 2 million cruzados by March to develop Query, a language designed for the end customer which makes it possible to manage a data bank, consult the system and make lists without requiring

any programming knowledge. At mid year, a multi-user version of SBD-TS will be announced, a development tool designed for analysts and programmers. The investment has cost 1 million cruzados, and the company plans to use Eden network software.

Among special projects, a system for controlling academic life at the Minas Gerais Federal University is under development. A production control system developed for the Rio Guayba Company, already operating in a multi-user mode, should be finished in June. There are plans to convert this system into a package.

Compucenter should start off the year by inaugurating a new Window (Microsoft) campaign, incorporating graphics and optimizing the use of microcomputers compatible with the PC-AT. According to Rafael Barajas, there should be an explosion of sales of this microcomputer next year in Brazil.

Mainframes

Having consolidated its product line of support software for IBM mainframes, Dataservice hopes to break into this market by introducing new features and products for these systems and marketing development support tools for foreign producers' systems. Included in its line of new producsts promised by mid-1987 are the V-CICS-CR, a CICS natural resources accounting system and an on-line test generator for use with IBM equipment. Another system, as yet unnamed, will make it possible to use a PC as a work station to develop and test projects based on CICS equipment.

Computer Associates will step up efforts to market products introduced toward the end of the year, such as the IBM natural resources accounting system, a logic protection system for data, and a system for managing a "relacional" [reference] data bank.

Software is also trying to consolidate its efforts to integrate microcomputers with a mainframe, begun earlier this year. But in mid-year it hopes to expand its line of utility applications by introdlcing the SGRH, a human resource management system, and opening its new office. For its part, MacCormack & Dodge should release the PIOS next year, a production planning and control system or Fa:M; a fixed-assets system and an office automation system or Fy:M. In addition, it will introduce a version of the Gl:M for IBM equipment (a system for managing a Cullinet "relacional" data bank).

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BRAZIL GRANTS TAX CREDITS TO COMPUTER FIRM INVESTORS

Rio de Janeiro DATA NEWS in Portuguese 23 Dec 86 p 20-23

[Article by Alaor Barbosa: "Tax Credits, the Salvation of Computer Firms"]

[Text] In order to encourage investment in computer companies, the government will allow the deduction of up to one percent of legal persons' income tax to purchase stock in computer firms.

Stock Market

For the first time in their history, Brazilian computer companies will have access to "subsidized" capital beginning next year. Under Public Law No. 7,232 of December, 1984, legal persons (companies) will be able to deduct up to one percent off their income taxes for the purchase of stock in computer firms. This means the National Treasury is foregoing this revenue to encourage investment in computer companies.

These monies must have been earned by investor companies after March/April of 1987, when 1986 income taxes come due. However, the experts have many doubts. It is estimated that the total to be split among computer companies and EMBRAER (the one percent tax deduction may be taken for investing in either the aeronautics company or computer firms) may be as much as 500 million to 600 million cruzados annually.

Few tax credits have come along at such a propitious time. The fact is that after a few euphoric months, computer companies, as well as businesses in other sectors, are seeing doors shut in their face on the capital markets. More than any other sector, stock in computer companies suffered a sharp price drop in the second half of 1986, making it difficult to attract capital from investors by offering stock on such a market.

Actually, 1986 can be divided into two quite different periods as far as computer companies and the stock market are concerned. Until February, prior to the Cruzado Plan, computer stock had experienced times of great euphoria. The mere mention that a computer company was looking for capital would bring out a veritable legion of investors interested in its stock. And many did not hesitate to pay 20 or even 30 times the estimated profit that the stock would earn, even as much as 50 times at peak moments, and

didn't consider that high. Now, many companies have a market price/earnings-per-share ratio of two or three, and the investors are not interested.

This lack of interest is not without good cause. The computer companies will probably have to show an exceptional performance to cure the "gaping wound" of heavy losses which the capital market accumulated in 1986 by buying stock in computer companies. It will be difficult to achieve the same success in attracting capital on the stock market in 1987.

Information from the Securities Commission (CVM) indicates that 11 computer companies offered stock on the market this year. All told, these companies obtained 1.2 billion cruzados from new investors, which is about $80 million at the official exchange rate, an impressive amount anywhere in the world.

Losses

At today's prices, however, these stocks would bring no more than 600 million cruzados to their unfortunate owners, if they were willing to sell them. This means a loss of $40 million that investors, mainly financial institutions serving as underwriters, had to absorb in just over 6 months. And this does not include setting up EDISA, since it was a block trade (the old stockholders sold part of their stock) or Scopus, which was set up by private subscription and not offered to the public. If all the startup costs were taken into consideration, losses would be a few hundred million dollars more.

Curing this gaping wound, however, will require a huge effort on the part of the computer companies if they are still interested in maintaining a good reputation on the capital market for the next several years. And those who think in terms of the long run will surely be interested in maintaining a good relationship. However favorably the government has looked upon the computer industry--and still does--no part of the economy can expect tax credits indefinitely. There have been several cases where companies trusted government promises and invested in their sectors to increase production and then found themselves nearly insolvent a few years later due to the lack of government financial support.

However this may be, the figures given above reflect the situation. In a single year, the computer industry was able to attract 1.2 billion cruzados on the capital market while the total that is expected to be attracted by the tax credit next year is only half that amount. Moreover, it does not make sense to shut the door on one source of capital simply because another opens. Clearly, the ideal is to have both alternatives.

Incentives

Another aspect to which computer businessmen must pay attention is the use of capital acquired through the tax credit. The negative experience provided by the Northeast Investment Fund (FINOR) and the Amazon Investment

Fund (FINAM) should serve as a warning. Having access to cheap capital, companies located in those areas disdained voluntary investors and now find themselves in a delicate situation. In the last economic deal, the president of the Republic himself, who is from the Northeast, had to intervene to prevent a cut in funding for the Northeast, which is recommended by experts in the Treasury Ministry. Therefore, it may be anticipated with some degree of certainty that this funding can depend on less money and further scrutinizing in the not-too-distant future.

Unlike the requirements for FINOR and FINAM, investors taking advantage of the tax incentive to buy computer stock do not have to hold the stock long. Current law allows investors to sell the stock on the market immediately, but investors in regional funds must hold their stock a minimum of 4 years.

This option is very attractive to buyers, but not so attractive to the computer companies issuing stock. It is in the interest of the companies for the buyer to hold stock as long as possible to prevent even greater pressure on the stock in the second-owner market. In addition, searching out strong partners (i.e., companies) that would otherwise be hard to attract may be an excellent way to enlarge a company's stock base.

Sharp-thinking firms may acquire partners like Petrobras, Alpargatas, Shell, Votorantim, Souza Cruz and others that might never have considered buying computer stock. Since these companies pay veritable fortunes in income taxes, they would surely have some interest in acquiring computer stock and will probably study the matter carefully to determine the best buys on the market.

Winners

In the next few months it will be easier for investors to determine the winners in the industry, especially in the case of the open companies. Since the books have been closed on 1986, the market will be able to sift out which companies performed their objectives and which did not, in terms of projected sales and profitability. Those companies that did not reach their goals will certainly have to provide better explanations than those firms that honestly presented their actual condition and potential.

At any rate, the past is not always the best guide to the future. Past successes do not always qualify a company to undertake new projects that will guarantee continued success. In few other sectors of the Brazilian and world economies is technology such a critical factor. A good product today may become totally obsolete in the space of a few months, losing out in the marketplace. The industry has not emphasized this enough to investors.

One thing that is clear on the Brazilian stock market is that investors and even professional analysts do not know how to evaluate a computer firm's potential correctly. Even computer experts realize that it is difficult, because the determining factor in the "quality" of a computer company as compared to other companies is its "brains," i.e., its ability to keep up

with developments and introduce products that are designed for new conditions and are compatible with state-of-the-art technology, rather than installed equipment, sales figures or the number of employees.

Demonstrating the industry's potential, however, is a permanent task for companies interested in attracting new partners. Another concern is showing that, in spite of the industry's newness, total computer sales are quite impressive, even in world terms: 1986 sales approached $3 billion, according to projections made by the Brazilian Computer and Peripheral Industry Association (ABICOMP). Even more important: sales have the potential to continue growing at 20 to 30 percent annually, which very few other areas of the economy are capable of matching.

Cheap Stock?

This is one area that computer firms have to work on. Capital market professionals do not consider computer stock in particular to be cheap. Current expert thinking is that it is not just computer stock whose price is falling, but companies in all areas of the economy whose stock is sold on the exchange. Professionals argue that if computer stock has fallen more than the stock of other industries, it is because its price was more overheated.

Among businessmen, however, there is a strong feeling that this is not quite the whole story and that other factors may harm their holdings of computer stock. One of these factors is American pressure on the market reserve in effect for certain areas of the Brazilian computer industry.

This is an area where the industry, for political reasons, has great difficulties promoting itself in the eyes of investors. Computer company owners know that their companies are making money and that an eventual dismantlement of the market reserve would not be "the end of the world" in the short term. The multinational companies would hardly undertake a "scorched earth" policy when that opportunity presents itself, even if only for reasons of strategy.

But since the market reserve is a strong rallying point, those who do not know all the ins and outs of the industry have difficulties imagining what would happen if it should be dismantled. In fact, computer businessmen themselves have many doubts, but the current word in their circles is that the companies that are struggling to continue investing in research and development will retain some sort of privilege, even if the multinationals obtain greater access to the market. However, companies that merely copy products developed abroad will not enjoy competitive conditions in the new order. This is another consideration that should encourage investors and analysts to identify the real winners in the Brazilian computer industry. A wrong choice could be disastrous in the medium term and long term.

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